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LANDEX HEADS.....FOR AUTOMATIC

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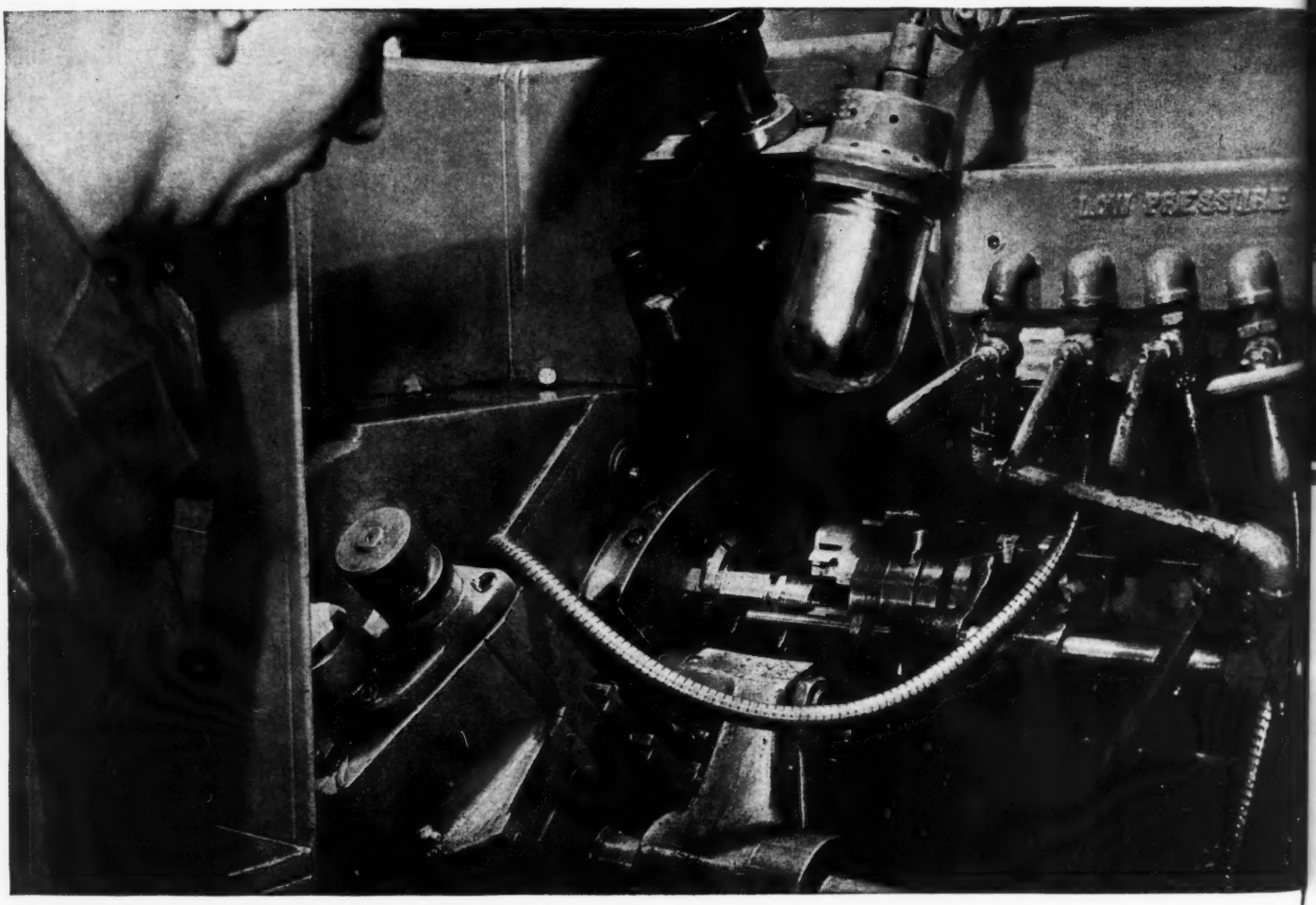
• In the illustration, the Type J LANDEX Heat Treated Head is being used on an automatic screw machine to produce 15/16″ diameter 16 pitch threads on stainless steel hex head bushings.



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MACHINERY

Volume 54 FEBRUARY, 1948 Number 6

Automatic Welding Speeds up Box-Car Production

By CHARLES O. HERB

Methods Applied at the Chicago Plant of the American Car and Foundry Co. Enable Box-Car Building to be Conducted on a Real Production Basis

THE immediate production of adequate rolling stock for the railroads is one of the major problems facing this country. If our widely separated manufacturing plants are to be kept busy turning out consumer products and capital goods, and if the essential supplies for Europe are to reach the eastern seaboard in sufficient amounts, and continuously, the railroad systems must be provided with additional transportation facilities.

The various car-building plants are working hard to meet these demands. At present, there are on order 126,000 freight cars, which will cost approximately $750,000,000. The American Car and Foundry Co. has been given an appreciable percentage of this total order and has several large plants almost completely engaged in the building of freight and coal cars.

The Chicago plant of this concern has recently been modernized for the production of practically all-welded refrigerator express cars. At the present time, twelve of these cars are turned out per day. They are approximately 55 feet long over the buffers, about 9 1/2 feet wide, and 13

feet high from the rails to the running boards on the roof. These cars are built to operate at speeds up to 100 miles per hour, and are therefore equipped with regular passenger car trucks having Timken tapered roller bearings. The cars are of all-welded construction, aside from the use of a limited number of rivets in the under frame and the rivets employed for assembling the car ends to the sides and for fastening on the roof. Rivets are employed in the latter instance to facilitate removal of the roof in the event that extensive repairs should prove necessary.

Automatic welding machines, straight-line production and assembly lines, and the extensive use of welding fixtures are features of this car shop. In the manufacturing line where the car sides are constructed, the various structural members are clamped in jigs equipped with air clamps, as seen in Fig. 1, which hold the different structural shapes accurately in position for hand welding with Lincoln Electric portable shielded-arc welding machines. All parts of the structural members that will contact other members are first shot-blasted to produce clean flat surfaces. When the side frames leave the first welding operation, they are straight throughout their entire length within very close limits for this type of structure.

After a complete side frame has been welded, it is rolled forward on the long welding table to the second station (Fig. 2), where the several sheets of thin-gage Cor-Ten steel that make up the sides are laid on the structural frame and accurately located by means of swinging clamps. These plates are then tack-welded to the frame by the use of shielded-arc welders.

Next, the side frame, with its tack-welded sheets, is moved to the third station along the welding table. Here the huge 17-ton gantry seen in the foreground of the heading illustration, which is equipped with two Lincoln Electric automatic shielded-arc welding heads, is employed to weld a seam along the top and bottom edges of the side plates as the gantry moves the length of the side frame. Welding is performed at a speed of about 110 to 120 inches per minute.

The practice is to position the gantry at one end of the side frame and then lower a series of pressure pads or shoes on the sheets for the full length that can be welded in one positioning of the gantry. A pressure of 15,000 pounds is applied on each set of pads slightly back of the welding area through motor-driven vertical screws, so as to insure full and firm contact of the sheets to be welded against the structural members beneath the sheets. Welding is performed for a distance of between 12 and 13 feet as the welding heads run along rails on the gantry, or until the welding heads have reached the opposite end of the gantry. Then, the gantry is relocated farther along the side frame for welding the next section of the side frame.

Fig. 1. Starting End of the Box-car Side Welding Table where Frame Members are Accurately Clamped in Place prior to Joining with Portable Welding Machines

This is repeated four times to complete the longitudinal seams on one side, the total length of the longitudinal seams being approximately 50 feet. A close-up view of one of the welding heads engaged in performing this operation is seen in Fig. 3. The pressure pads that hold the sheets down can be seen at the left of the weld.

When the longitudinal seams have been finished, the side frame is moved to the next station along the welding table and the gantry is returned to the starting end of the third station. Three gantries of somewhat smaller size than the first are provided at the fourth station for welding the vertical seams formed by the edges of the sheets on the side frame. A general view of these gantries is shown in Fig. 4. Each of the gantries is equipped with a Lincoln Electric automatic shielded-arc welding head. The sheet edges in this operation also are firmly clamped against the structural stringers of the frame by means of a series of pressure pads or shoes similar to those provided on the longitudinal welding gantry. The three gantries are operated simultaneously, being positioned at different points along the car side.

In this "Lincolnweld" process, granular flux is deposited on the joint to be welded to a depth sufficient to cover the weld when completed. Bare metallic welding electrode is fed by power into this blanket of flux at a rate controlled automatically to suit the proper arc length. Direct current supplied by the welding head produces a hidden arc between the electrode and the joint. The heat from this arc fuses the electrode and the parent metal and thus produces the weld.

The flux adjacent to the arc melts, floats on the surface of the molten metal, and then solidifies as slag on top of the weld. This can be readily removed, as may be seen from Fig. 5, by the use of a suction hose line. This illustration shows a close-up

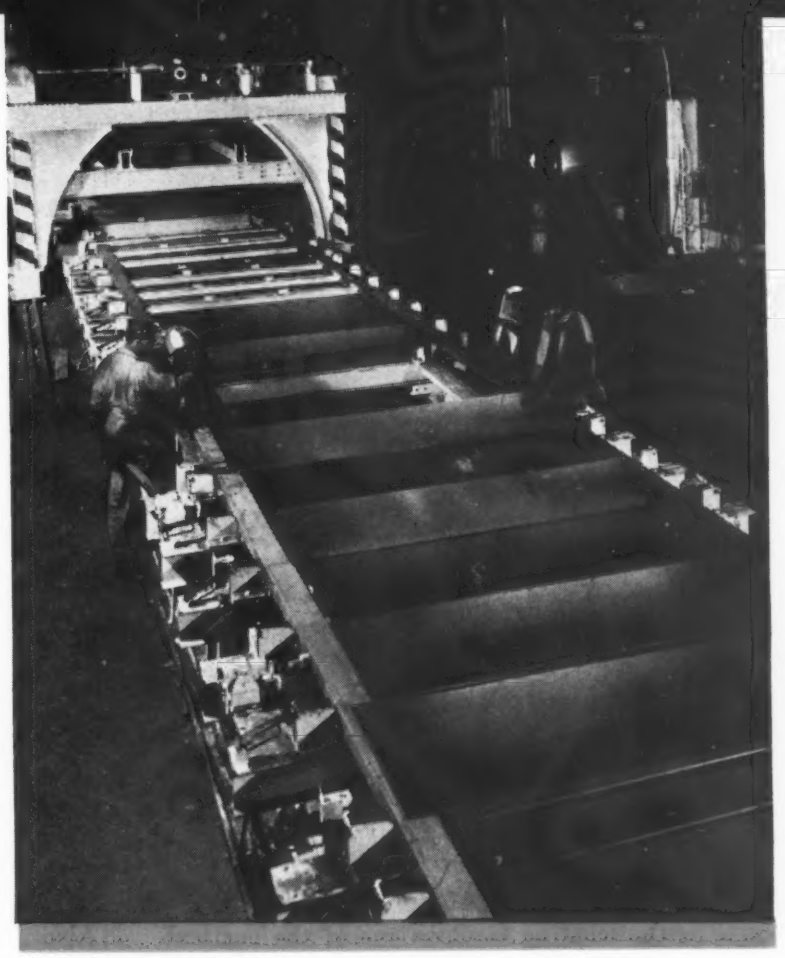


Fig. 2. Second Station along Car-side Welding Machine, where Steel Sheets are Assembled by Tack-welding, Ready for Automatic Welding

Fig. 3. One of the Welding Heads on the Large Gantry Used in Welding the Longitudinal Seam along the Top and Bottom of the Car Sides

view of the welding head on one of the vertical-seam welding gantries. Since the arc and the molten metal are blanketed by the granular flux at all times during the welding operation, the weld metal is completely protected from contact with the air. This insures welds of maximum quality, and makes possible the use of unusually high amperage for fast welding at low cost.

Also, because the arc is confined within the blanket of flux, spatter is negligible, and this eliminates the expense of weld cleaning. There are no arc rays or smoke in this welding process, which, of course, results in improved working conditions.

All operations of the automatic welding equipment are so safeguarded that there is no possi-

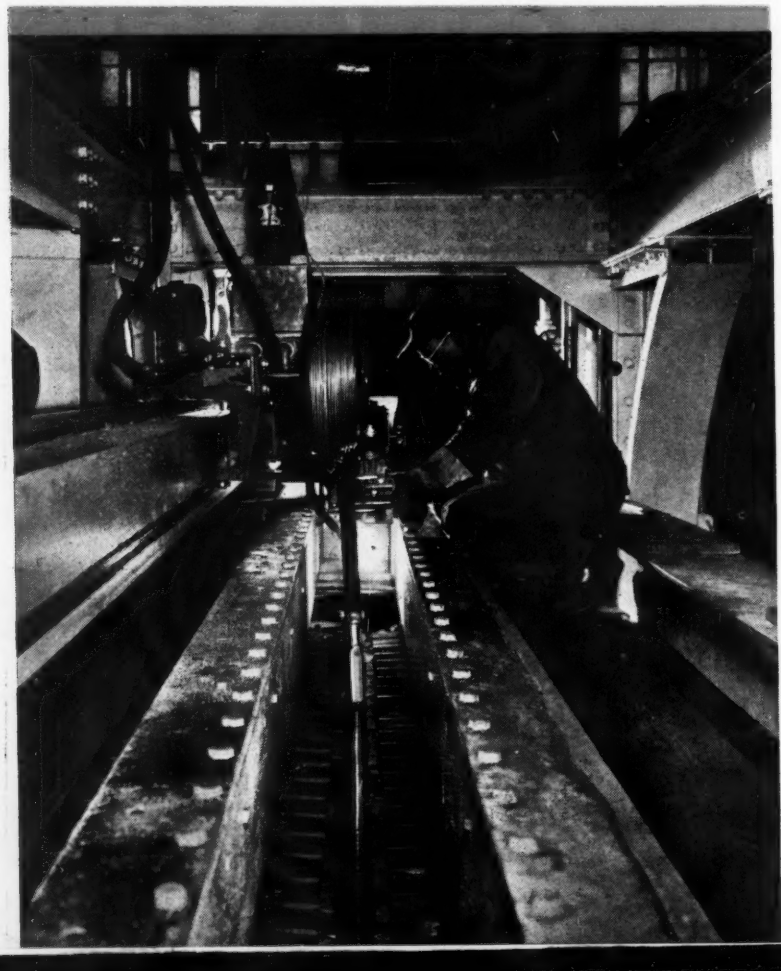
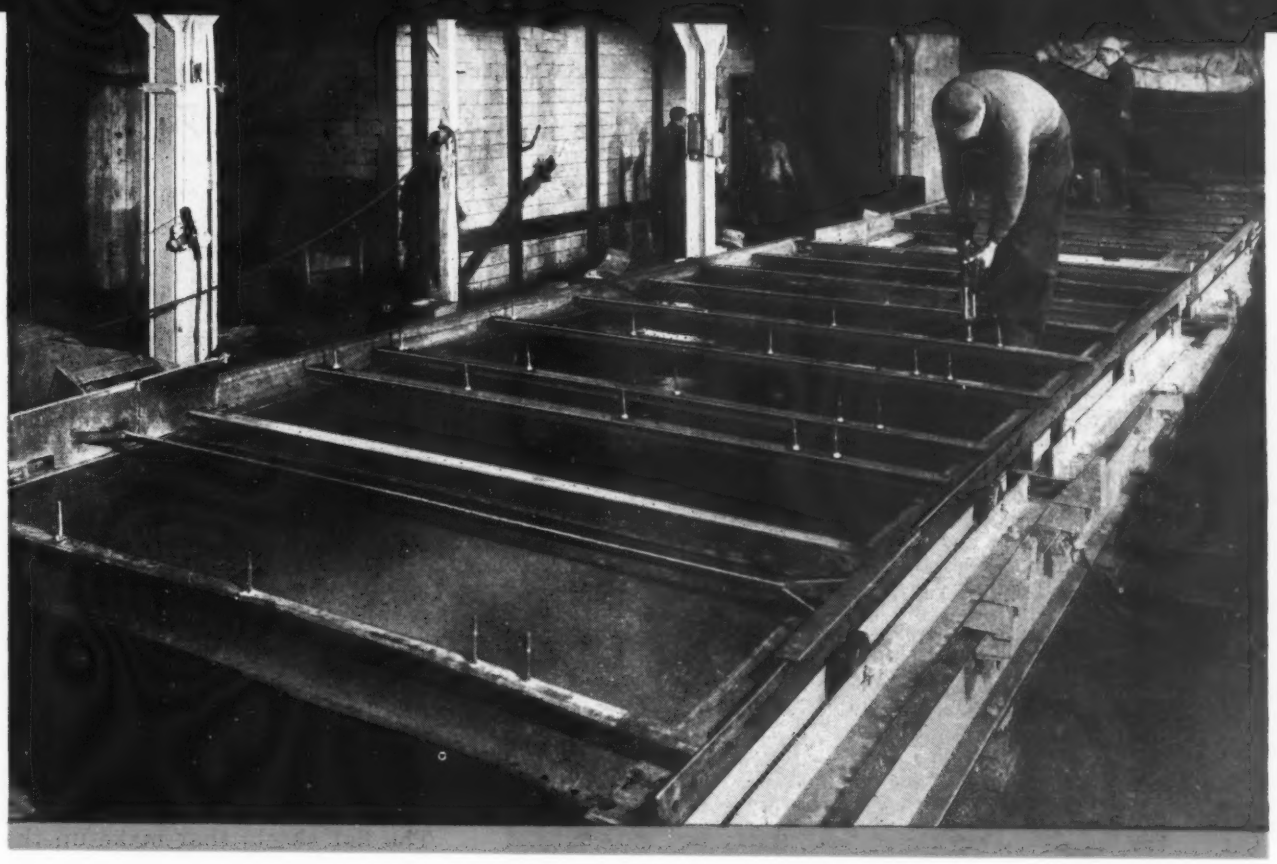


Fig. 4. (Above) General View of Three Gantries which are Equipped with Lincoln Electric Automatic Shielded-arc Welding Heads for Welding the Vertical Edges of the Sheets on the Car Sides

Fig. 5. (Left) Close-up View of the Welding Head on One of the Gantries that Welds the Vertical Seam between the Sheets on the Car Sides



bility of injury to the workman. For example, it would not be possible for a workman to be squeezed between two of the gantries.

At the end of the automatic welding operations, the side assembly is pushed along the table to the next station, where the welds are cleaned off. They then pass to a station where studs are welded to the inside of the car sides with hand welding heads, as shown in Fig. 6. These studs are used for the attachment of wooden stringers that hold insulation in place. Following the stud-welding operation, several other minor steps are performed, after which the sides are ready for the car assembly line.

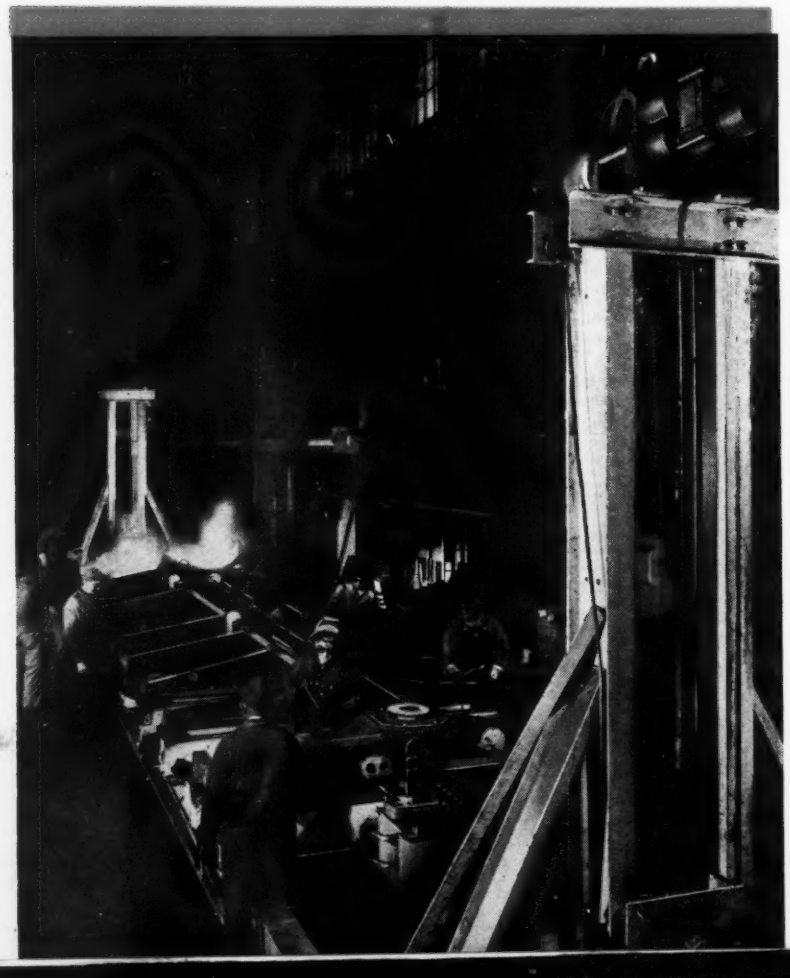
The roofs for these cars are fabricated by the use of automatic welding equipment similar to

Fig. 6. (Above) After the Sheets that Form the Car Sides have been Welded to the Frame, Studs for Attaching Wooden Stringers are Assembled to Frame Members by the Use of Hand Welders

Fig. 7. (Right) General View of the Beginning of the Roof Welding Line, which Shows Arrangement of Pneumatic Clamps along Each Side of Jig

Fig. 8. View of One of the Welding Heads, Showing Contour Bar that Controls Rise and Fall of Head as It Follows Curvature of Roof

Fig. 9. Under Frame is Assembled with Center Sill, Bolsters, and Cross-ties Located in a Jig Provided with Pneumatic Clamps



that employed on the car sides, and the procedure, from beginning to end, is approximately the same. Fig. 7 shows a general view of the beginning of the welding table used for fabricating the roof frame. The principal difference between the welding technique on the car sides and on the roof is that, in the latter case, owing to the fact that the roofs are crowned, it is necessary for the welding heads to rise and fall as they proceed from one side of the roof to the other. This rise and fall is controlled by a narrow contour bar or cam, as shown in Fig. 8, a roller mounted on each welding head riding on the corresponding contour bar.

The flat sheets that make up the roof top are clamped on the framework without any preliminary stretching operation. These sheets are thin-gage Cor-Ten steel. The roofs are insulated after being fastened to the car.

Welding operations on the under frame are accomplished with portable shielded-arc welders. All of the work is done with the frame members accurately located in jigs. Locating surfaces on the first jig represent the deck of the box car, which insures dimensional accuracy. The bolsters and cross-ties for the under frame are fabricated before they come to this jig, and are therefore clamped to the center sill in the form of sub-assemblies. All welding is performed downward, with the joints held in a horizontal position.

The jig used for the first operation on the under frame is shown in Fig. 9. The center sill and the bolsters and cross-ties are placed upside down in this jig. When they have been welded together on one side, the entire under frame is raised on the columns at the ends of the jig and then turned right side up before being taken from the slides on which the frame is supported.

The assembly is then moved by crane to an adjacent jig, where all

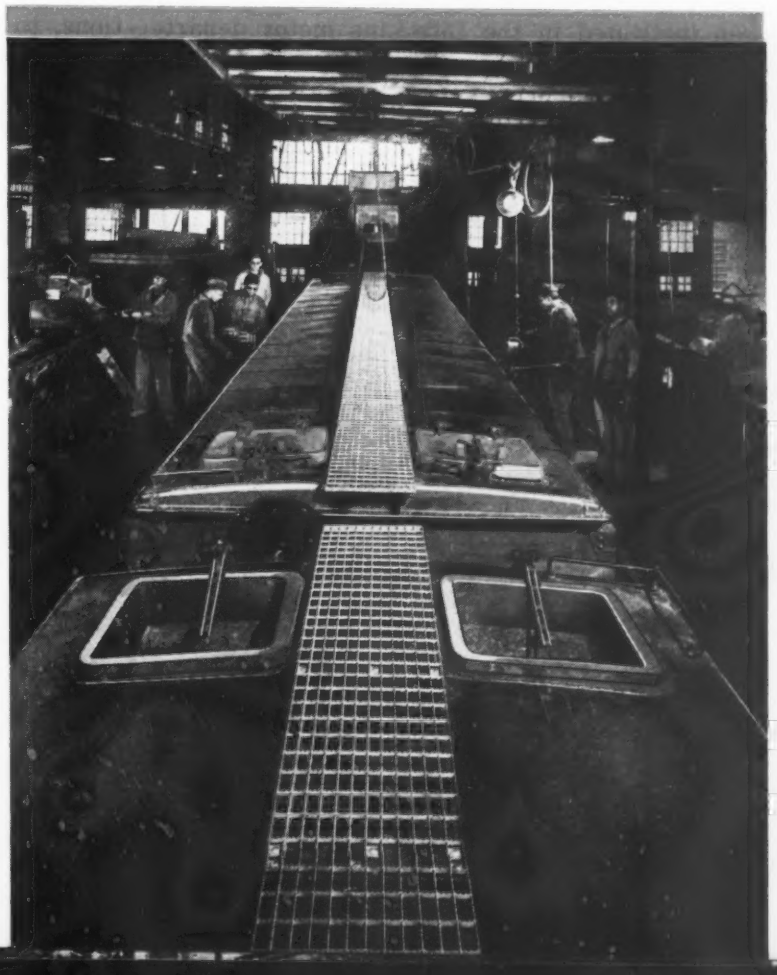
Fig. 10. A Positioner is Employed for Welding the Surfaces on the Under Frame that Cannot be Held Horizontally in the Two Jigs Used in Preceding Operations

joints on the top side are welded, the joints again being held in a horizontal position. No clamps are necessary on this jig because the joints on the opposite side have been welded, and the parts are thus accurately held in position.

All edges of the assembly that could not be held in a horizontal position in the first and second jigs are welded in a third operation, with the under-frame assembly mounted on the positioner seen in Fig. 10. Thus every surface can be brought into a horizontal position by revolving the assembly.

When the under frames are taken from the positioner, they are placed on a floor inspection stand and checked for straightness in the horizontal plane. Corrections for camber in the center sill can be made by fastening down the sill in the middle and forcing either or both ends up by means of pneumatic jacks. When the sills are too low in the middle, the ends are held down and the middle of the sill is forced upward by means of a pneumatic jack.

Fig. 11. End of Box-Car Assembly Line



Camber up to 3/4 inch can be taken out of an under frame by this method. When the under frames leave the fixture, they are straight within close enough limits to permit accurate assembly of the sides and ends.

All operations in fabricating the under frame, roof, and sides are timed to suitable production schedules. Blasts from a whistle notify the men in charge of each operation when the time has come to move the work to the next fixture, the next location along the welding table, and so on.

The first step in the erection of these express refrigerator cars consists of assembling the passenger-car type trucks. This work is done on a railroad track which leads to a point adjacent to the welding positioner used for the under frames. Two small turntables and a short spur track provide means of bringing the trucks to a point in front of the under-frame checking fixture, so that the under frames can be lifted onto the trucks immediately after checking.

The trucks, with the under frames mounted on them, are advanced progressively on a railroad track adjacent to the side and roof fabricating lines. As they move along this track, the box cars are gradually assembled, the sides and ends first and the roof last. The car ends are of a patented design and are supplied by an outside concern. The cars are automatically washed and cleaned in large booths and are spray-painted before the roof is attached. Fig. 11 shows the tops of several cars that are nearing the end of the assembly track.

High production in this car shop has been attained through the application of these modern welding methods and the installation of the straight production lines. Roughly, 800 feet of joints on these cars are welded automatically and about 675 feet by hand methods. The welded construction enables box cars of lighter weight and greater strength to be built than heretofore, and also makes maintenance of the cars easier.

Die-Casting Aluminum Rotors on a Vertical Hydraulic Press

MANY unusual operations that make for efficiency and economical production have been instituted in the Life-Line motor department at the plant of the Westinghouse Electric Corporation recently established at Buffalo, N. Y. One of the most interesting operations consists of die-casting aluminum on the rotors to fill the helical slots provided by the laminations, to form solid end rings of aluminum at both ends of the laminated section, and to form fan vanes on one of the end rings. The die-casting operation locks the laminations perma-

Fig. 1. Appearance of Completed Die-cast Aluminum Rotors, Assembled on Shafts

nently in a slightly staggered relation, so as to insure the desired helical arrangement of the slots.

The appearance of these rotors as they leave the Lake Erie hydraulic press used for the die-casting operation may be seen in Fig. 1. In this illustration, however, the rotors are shown assembled on their shafts, which is done after the die-casting step.

At the beginning of a die-casting operation, a ladle of molten aluminum dipped from an adjacent pot type furnace is poured into the pot of the hydraulic press, as shown in Fig. 2. Then, a stack of laminations, mounted on an arbor or skewed sleeve and on a cylindrical plug, as shown at the right, is placed in the mold or die with the bottom edge of the laminations about 1/4 inch below the press platen. The plug on which the laminations are mounted has a series of shallow vertical slots in it, which serve as gates in the die-casting operation.

A disk of asbestos slightly larger than the pot or injection cylinder diameter is placed in the pot on top of the injection piston before ladling the aluminum into the pot. The asbestos disk performs three functions: (1) It acts as an insulator to prevent chilling the molten aluminum when it comes in contact with the water-cooled pot and piston; (2) it assists in preventing the erosion that normally results when molten aluminum comes in contact with a cast-iron pot liner and piston; and (3) it serves as a gasket to seal off any clearance between the cylinder and the piston.

In Fig. 3, which shows a cross-sectional view of the die-casting mold or die, the pot in which the molten aluminum is poured is indicated at *A*. The plug is shown at *B*, the arbor on which the laminations are mounted at *C*, and the space occupied by the laminations at *D*.

When the rotor assembly has been positioned, as seen in Fig. 4, and the operator pushes buttons to start the operation of the hydraulic press, the cylinder liner *E*, Fig. 3, which is entirely surrounded by a water jacket *F*,

Fig. 2. Molten Aluminum is Ladled into a Pot in the Bed of the Hydraulic Press, Ready for Die-casting the Aluminum through the Slots of Rotor Laminations. End Plates and Fan Vanes are Also Formed on the Rotor in This Operation

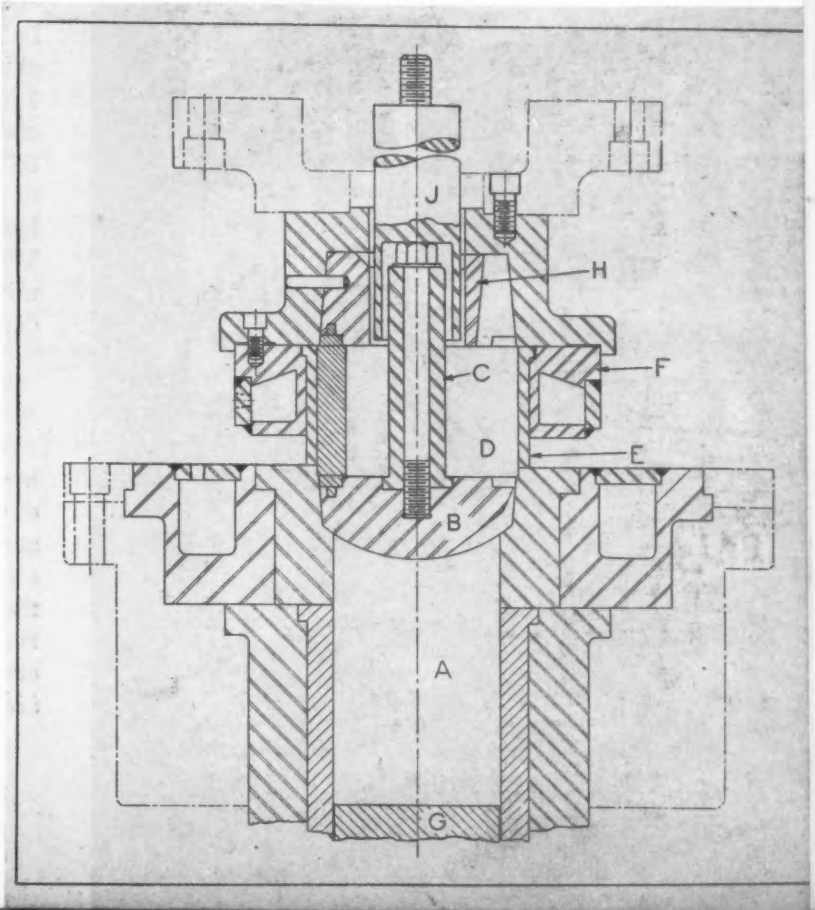


Fig. 3. Cross-sectional View of Die Equipment Employed in Casting Aluminum on the Rotors to Fill the Lamination Slots and to Form End Plates and Fan Vanes on the Laminations

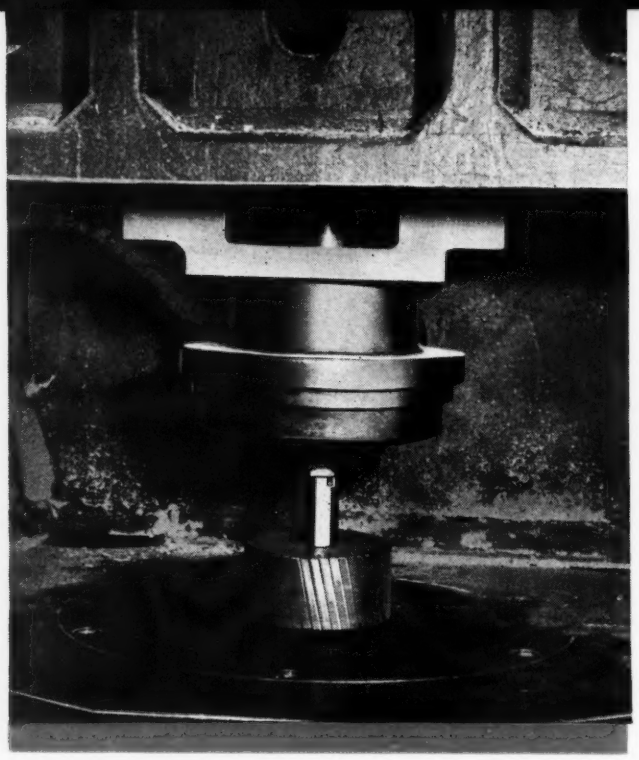
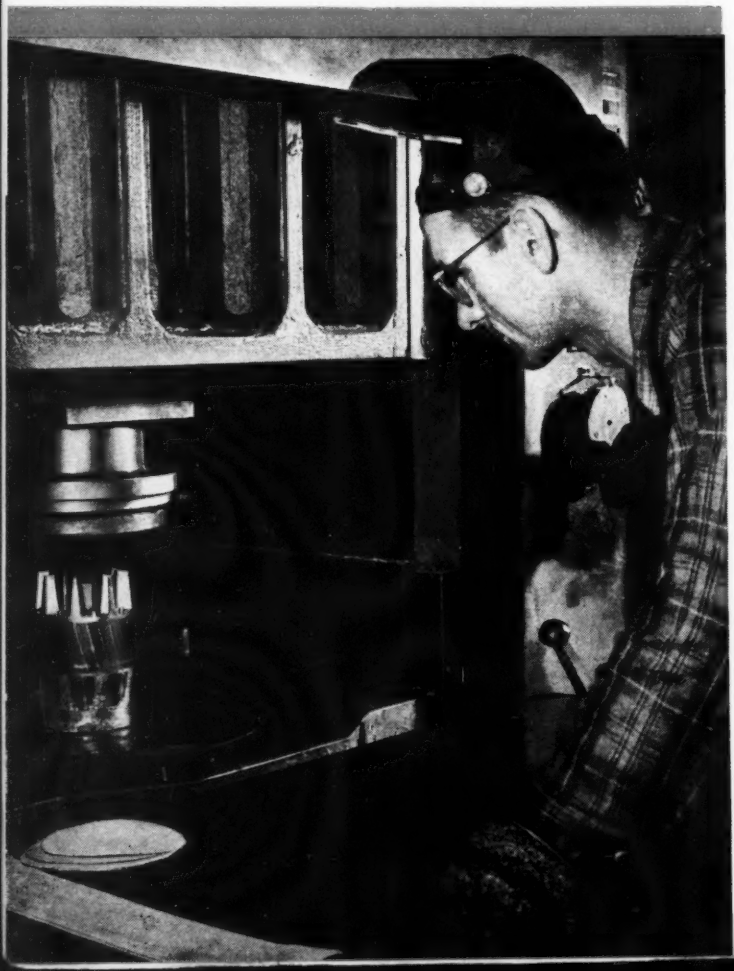


Fig. 4. Stack of Rotor Laminations in Place on Hydraulic Press with Laminations Held in Proper Radial Relation to Each Other by a "Skewed" Sleeve which Insures Desired Helix Angle of Lamination Slots

Fig. 5. View of Hydraulic Press at End of Rotor Die-casting Operation, Showing Rotor and Its Supporting Plug in Raised Position to Facilitate Removal of Work



descends under power supplied by the upper hydraulic ram and encloses the rotor. This provides an upper die member for the operation. Then a guard or screen is lowered at the front of the press to prevent the molten metal from spattering on the operator during the die-casting operation. An interlock prevents operation of the injection piston if the guard is not in place.

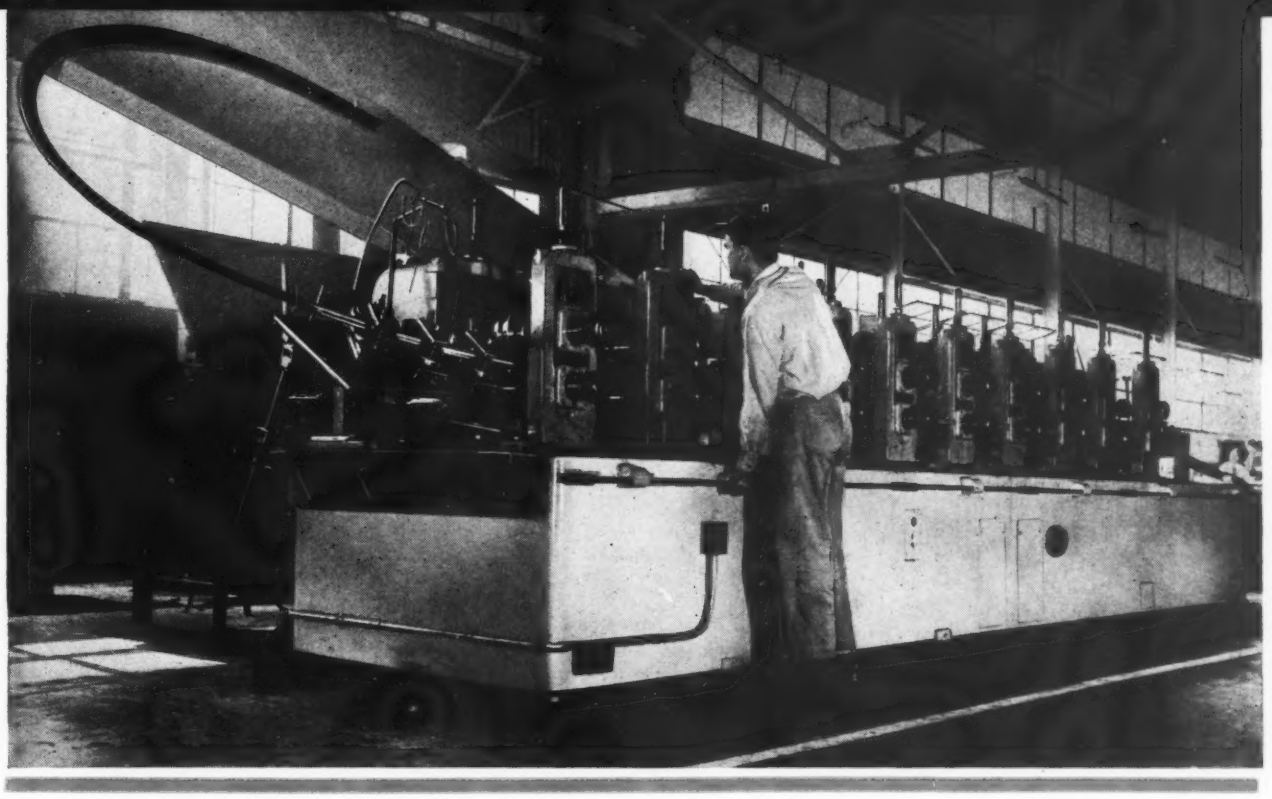
Plunger *G*, operated by the lower hydraulic cylinder of the press, is next actuated upward to force the molten aluminum past plug *B* up through the slots in the laminations and into the slotted ring *H* which forms the top end ring of the assembly and its fan vanes. At the same time, the bottom end ring of the rotor assembly is formed as molten aluminum is forced into a step that runs along the top outer edge of plug *B*.

After the operation has been performed as described, the die members are held closed for about fifteen seconds to permit the cast metal to solidify. Then the upper press ram is automatically raised. Knock-out bar *J* remains stationary momentarily to strip the rotor assembly from ring *E*. Then plunger *G* makes a short upward movement to strip the rotor assembly from the bottom die member. The excess metal in cylinder *A* forms on the bottom of plug *B* as a "pancake," which is easily knocked off by the machine operator and remelted.

The pressure employed to inject the molten aluminum is 35 tons, while a pressure of 75 tons is applied by the upper cylinder and piston to clamp the dies closed against the action of the bottom cylinder and piston. However, the machine has a capacity for applying a pressure of 100 tons for the injection and 150 tons for clamping. The upper ram has a total stroke of 24 inches, and knock-out bar *J* has a movement of 6 inches relative to ring *E*. The piston in the lower cylinder has a maximum stroke of 7 inches. The die members with which the molten aluminum comes in contact are made from molybdenum steel.

* * *

In the face of the record, I do not understand how any American can doubt the soundness of our institutions. I do not understand how he can even consider adopting policies and principles which, when put into effect by governments—in ancient times or today—have always resulted in a loss of personal liberty and an increase in human misery.—*C. E. Wilson, President, General Motors Corporation*



Forming Metal Shapes by Cold-Rolling

By E. J. VANDERPLOEG
The Yoder Co., Cleveland, Ohio

Types and Construction of Roll-Forming Machines and Kinds of Accessory Equipment Required for the Fabrication of Various Shapes — First of a Series of Articles on the Cold Roll-Forming Process

ROLL-FORMING is being increasingly applied in the automotive, aviation, railroad, construction, and general manufacturing industries because this process does not require the attention of skilled operators and can be used to produce low-cost, high-quality shapes in large quantities. The roll-forming process, which consists of shaping a section of rolled or strip material in a series of progressive forming rolls, is being used for producing welded pipe and tubing, making a wide variety of decorative parts from steel and non-ferrous alloys, and forming structural machine parts that have a high strength-to-weight ratio.

An almost unlimited number of shapes—from standard angles to parts having very complex cross-sections—can be produced. Also, a wide range of materials can be handled by the cold roll-forming process. These include hot- and cold-rolled carbon steel; stainless steel and a variety of other alloy steels; bronze, brass, copper, zinc, aluminum, magnesium, and many other metals and alloys, all of which are available in sheets, strip, or plates, either flat or coiled. Of course, not all of these materials can be used for every job, their suitability for a given application depending on the complexity of the cross-section and the ability of the material to resist cracking.

The sizes of the sections that can be slit and cold-formed on standard roll-forming machines range from thin-gage stock up to material 3/4 inch thick, and from a fraction of an inch wide up to 80 inches in width. The greatest volume of products, however, is made from coiled strip less than 0.125 inch thick and narrower than 20 inches. This is not because heavier and larger sections are impractical, but simply because, with an increase in size, the investment in equipment becomes greater and the demand is smaller.

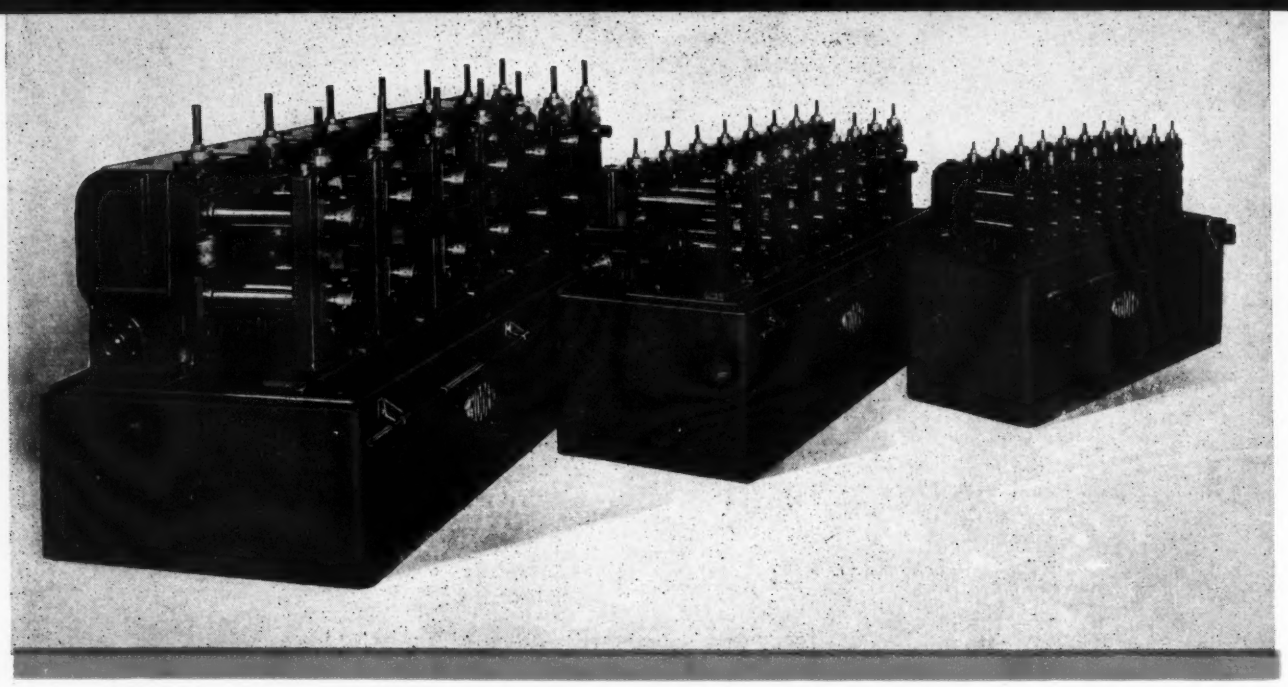


Fig. 1. Standard Roll-forming Machines, Consisting of a Base on which are Mounted Supports for the Spindle Bearings, which Vary in Size, Number, and Type on Machines of Different Capacities

In the early history of the process, the set-up, adjustment, and operation of roll-forming equipment were considered problems for a rolling mill expert. But as the applications increased, standard lines of machines were developed that minimized the skill and experience needed for their operation. The modern types of roll-forming machines can be set up by the ordinary shop mechanic or foreman, and can be operated by semi-skilled workmen.

Standard machines for forming sections up to 16 inches wide by 0.156 inch thick consist of a base on which are mounted the supports or housings for the spindle bearings. Three typical units are shown in Fig. 1. The number of spindle supports depends on the size of the machine and the type of job for which it is intended. On any particular unit, one or more of these housings can be removed without affecting the adjacent support, so that a sixteen-spindle machine can, if desired, be operated with only two rolls. Often the end supports are removed to provide space for auxiliary slitting rolls or curving dies.

The type and arrangement of the housings determine whether the roll-forming machine is classified as the "outboard" type, having an overhung spindle, or of the "inboard" type, in which two spindle supports are used. The outboard unit is designed primarily for forming small shapes from light-gage metal, and for such work has two distinct advantages—it is easier to set up and has a lower first cost. As shown in Fig. 2, the housing of a unit of this type is equipped with a large bearing surface.

Fig. 2. "Outboard" or Overhung-spindle Machines are used Primarily for Forming Small Shapes from Light-gage Metal

Inboard machines are more widely used than outboard models because the deflection of the spindle is much less when it is supported at both ends than when held by a single housing. Also, in roll-forming, set-up time is not a primary consideration, since the life of a set of rolls is quite long and the "down time" of the machine is small in comparison to the operating time. Thus, the advantage of decreased set-up time in the outboard model is minimized by the nature of the process.

The double-housing units have been made with spindles up to 15 inches in diameter for forming heavy structural parts and large pipe. In cases where a large machine is used for light work and an overhung spindle might be advantageous, an inboard model can be converted to the outboard type simply by loosening the holding bolts and moving the outboard support in against the drive housing.

An inboard housing assembly is shown in the drawing, Fig. 3. It consists of a cast, semi-steel drive housing *A*, which is oil-tight and interchangeable with any other housing on the machine; tapered roller bearings *B*, which support the upper and lower spindles *D;* and a semi-steel outboard housing *C*, which can be moved inward to provide better support when handling narrow sections. The vertical distance between spindles can be varied, within limits, by a screw adjustment that moves the entire roll assembly the desired distance in the housings. For accurate adjustments, micrometer dials *G* are provided on both supports; an additional advantage of the micrometer dials is that the correct settings for any new shape can be recorded to facilitate future set-up of the rolls.

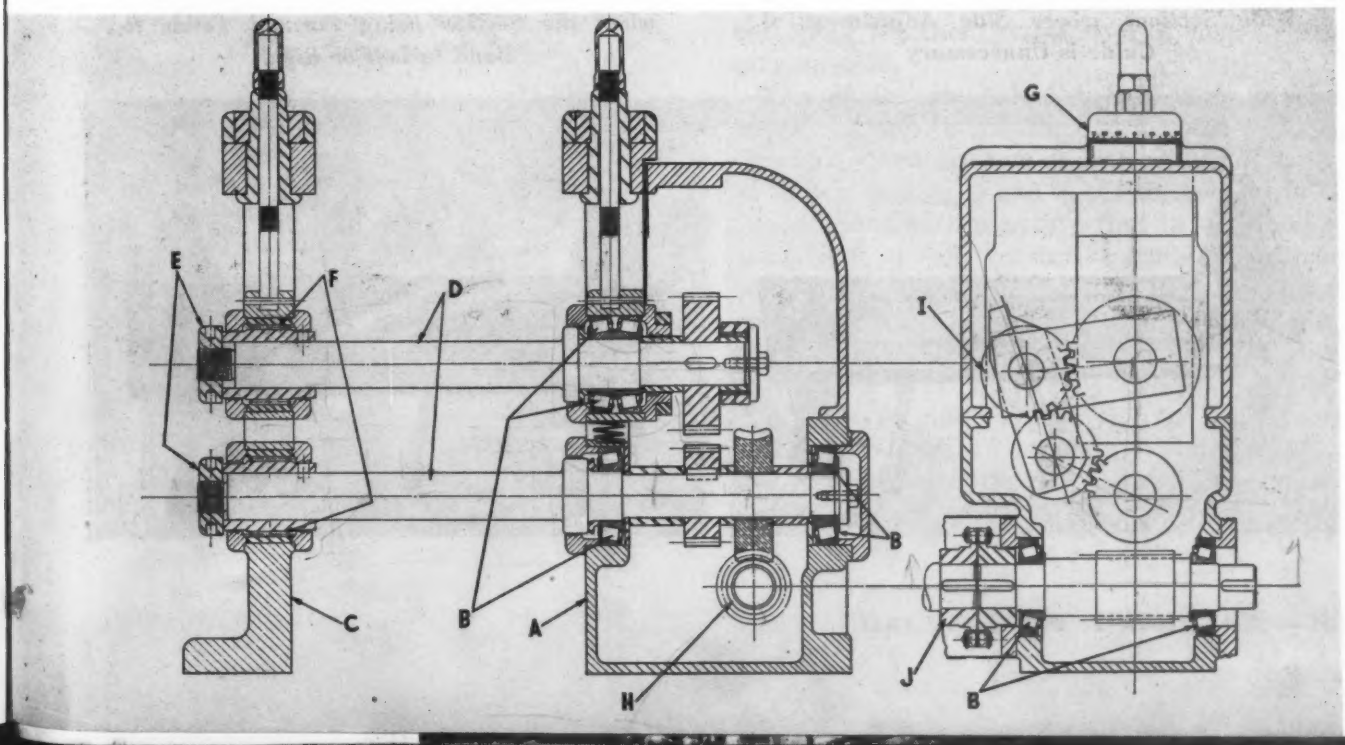
Both the upper and lower spindles are driven, through appropriate gearing, from the worm-gear *H*. This gear is coupled to the drive-shafts on adjacent housings by a chain type flexible coupling *J* which can be disassembled in order to permit easy removal of any housing on the machine.

The gear train that drives the upper spindle is designed to permit a considerable amount of roll adjustment with a constant gear mesh. The two intermediate gears are mounted on toggle arms and remain in contact with the main driving and driven gears, even when the upper spindle is raised or lowered to accommodate various types of work.

This gearing to the upper and lower spindles may be equal or unequal, depending on whether the rolls are of the same diameter or of different diameters. Should the latter condition exist, the spindle carrying the smaller roll must operate at a higher rotational speed than the other spindle, in order to equalize the surface speed of the two rolls. Although the unequal gear ratio differs slightly between the various sizes of machines, it is usually about 1.33 to 1.

The ratio between the spindle gears—whether equal or unequal—forms another basis for classifying roll-forming machines. The units with unequal ratios, in which the upper or male rolls

Fig. 3. Construction Details of an "Inboard" Forming Machine. Note Toggle Type Gearing I Employed to Permit Adjustment of Upper Spindle, and Chain Type Flexible Couplings J that Connect the Worm Drives



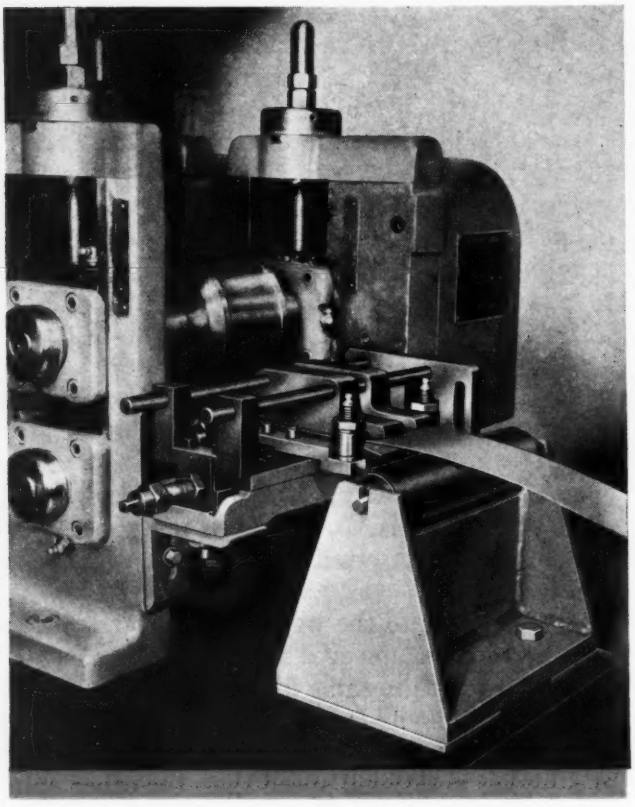


Fig. 4. Starting Guides, Either of the Roll or Bar Type (the Latter being Shown in This Illustration) Guide Metal Strip into First Pair of Forming Rolls

have a larger pitch diameter than the lower rolls, are used to form sections having deep profiles like a conventional channel form. The reason for this design is purely an economic one: If rolls of equal diameter are used to shape a deep section, the distance between the center lines of the spindles must be larger; if one roll is smaller than the other, the distance between the spindles can be smaller, the cost of the machine will be less, and the profile still can be formed.

Many fabricators prefer to have a machine of the greatest versatility, and the unequal gearing type is therefore widely used. The use of the equal gear-ratio type is confined largely to plants in which there is plenty of work on one or more sections of shallow profiles to keep the machine operating at capacity, such as light trim for automobile equipment and furniture.

The speed of the spindles can be controlled by a variable-speed drive on the main driveshaft, but in many instances, a constant-speed machine is specified, and this is, as a matter of fact, standard equipment. It is seldom that the speed of the machine is changed much for different jobs. Actual speeds range from 50 to 200 feet per minute; on experimental work, much higher speeds have been successfully maintained. In so far as the machine is concerned, the speed at which roll-forming can be performed might be greatly increased were it not for the limitations usually imposed by the equipment available for handling the flat stock and finished shapes, and sometimes also by the cut-off machine.

Devices for Guiding the Strip Metal

With a roll-forming machine, certain accessories are required to guide a strip of metal into, through, and out of a series of forming rolls, and to assist in the forming operation, mainly

Fig. 5. Fixed Guide Supports are Suitable for Wide Sections, where Side Adjustment of Guide is Unnecessary

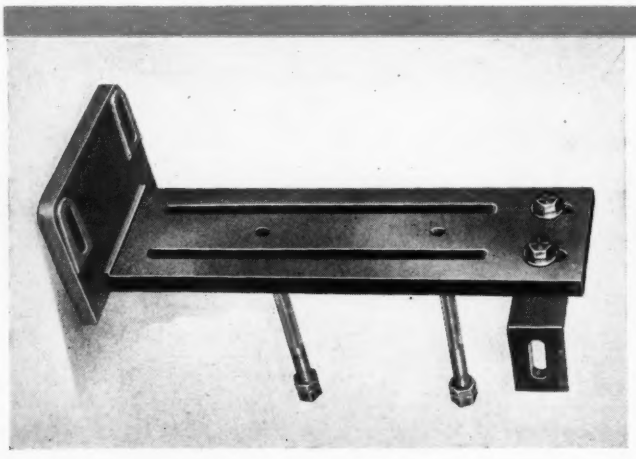
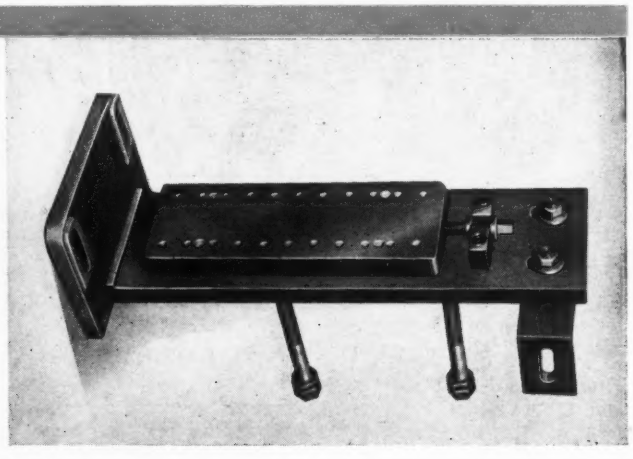


Fig. 6. Adjustable Guide Supports are Used when the Section being Formed Tends to Bend to Left or Right



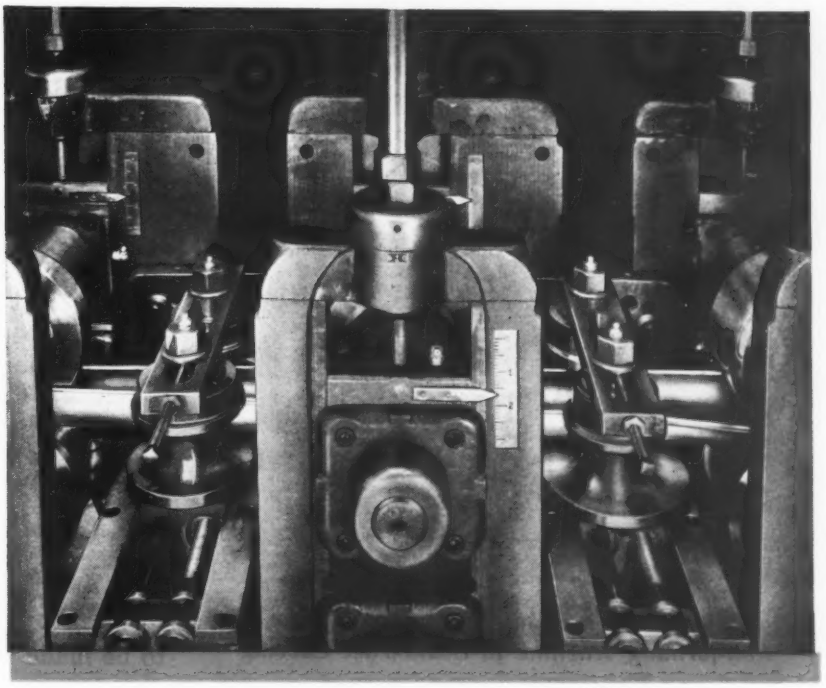
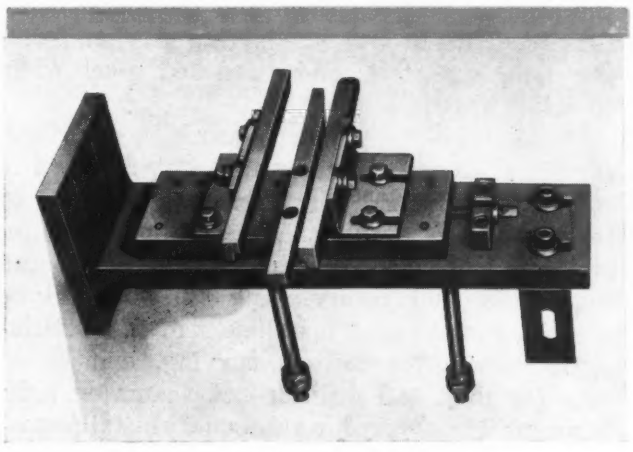


Fig. 8. Idler Rolls, which are not Power Driven but Supplement the Forming Done in the Main Rolls, are Frequently Used

by exerting side pressure on the strip. The number and design of these accessories vary somewhat to suit each set of forming rolls, but they are basically similar. Included in the classification of accessories are starting guides, bar type guides, idler rolls, and straighteners.

Broadly speaking, guides are designed for four purposes: (1) To keep the strip stock as it is fed into the machine in proper alignment with the first pair of forming rolls; (2) to prevent vertical and horizontal deflection of the strip in its passage between rolls; (3) to apply pressure from the sides, such as pinching in edges or sides of the partly formed strip, in preparation for its entry into a following roll pass of narrower contour; and (4) to prevent twisting and curving of the shape as it leaves the machine.

Fig. 7. One or More Bar Guide Assemblies are Usually Necessary to Maintain Alignment of Strip between Roll Passes



In all cases, whether coiled or cut-to-length strips are to be formed, it is necessary to use either starting bar guides or roll guides to lead the strip into the first roll pass. These guides maintain the strip of metal in the correct horizontal or vertical alignment with the first pair of forming rolls. The roll guides consist of a pair of rolls, one on each side of the strip, and the bar guides of a bar on each side with a groove or step on the inside faces to hold the strip, as shown in Fig. 4. Both types of guides are adjustable horizontally in or out, either separately or together, by means of a double screw arrangement.

The guides are bolted to an angle bracket which, in turn, is attached to a guide support, of which there are two slightly different types, as shown in Figs. 5 and 6. If the section to be formed is of such a nature that it may tend to bend right or left, corrective guide adjustment must be provided by mounting it on a support having an adjustable plate. For relatively flat and wide shapes, this plate may be dispensed with and a plain guide support used.

A bar type guide assembly of the type shown in Fig. 7 is used to maintain the alignment of the strip between the roll passes. The guides proper, each of which is designed for a partic-

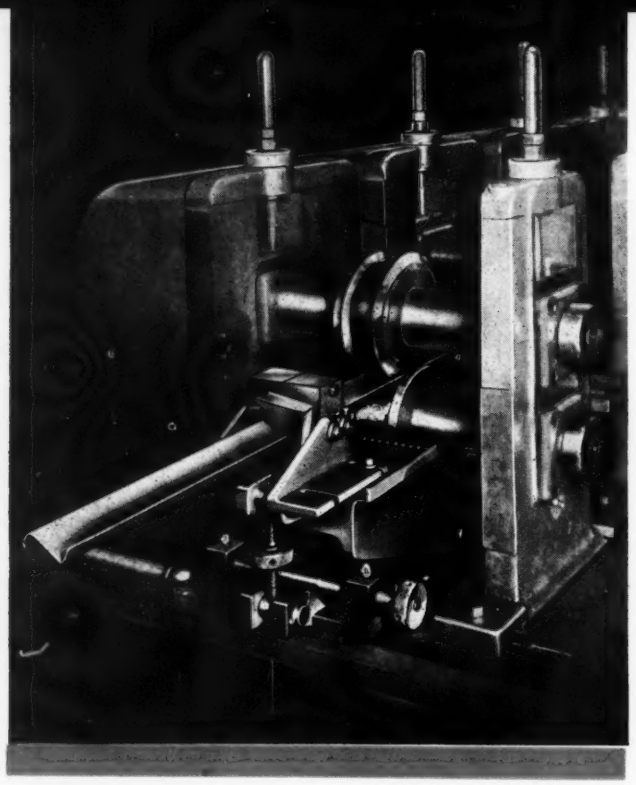


Fig. 9. A Straightener is Attached to End of Roll-forming Machine to Counteract Curving or Twisting of Finished Section

ular shape, are shown attached to an adjustable guide support. The guide supports are attached to the spindle head and to the top of the machine base at a height that varies according to requirements. One or more of such bar type guide assemblies are, with few exceptions, necessary for all shapes to be formed.

Function of Idler Rolls

Idler rolls are so called because, unlike the main rolls, they are not power driven; they are, however, designed to do a certain amount of forming, supplementing that done by the main rolls. They are especially useful in the forming of curved or recessed contours in a vertical plane. To this end, idler rolls generally rotate on a vertical axis, and are adjustable mainly in the horizontal plane—just the opposite of the main rolls.

An idler-roll support is similar in shape to a guide support, and is attached to the machine base and spindle housing in the same manner. Spindles for the idler rolls are mounted in bearing blocks which can be positioned on the support to accommodate different roll sizes. In Fig. 8 are shown two pairs of idler rolls mounted on adjustable supports between two successive roll passes, in a set-up for forming locked seam tubing.

By using idler rolls for auxiliary forming in the horizontal plane, the amount of work that has to be done by the main rolls may be reduced. When idler rolls are required, usually one or two pairs will be sufficient.

Operation of Straighteners

A straightener is always attached at the exit end of a machine, close to the last roll pass, and is designed to prevent the finished section from curving or twisting in any direction.

One type of straightener, shown in Fig. 9, consists of a table on which the different straightening guides may be mounted as required. The table pivots vertically on the base, so that if the finished shape tends to bend up or down, the table can be tilted in the opposite direction. The base of the table swivels on a single vertical bolt, and can be moved left or right to offset any tendency of the strip to bend in the horizontal plane.

The straightening guide, which, of course, has to be made to fit each different shape to be produced, is made of two blocks, clamped longitudinally in a fixed position. The guide may be turned on its axis in the clamp block so as to counteract any twist in the finished section.

Wide sheets, such as are used for roofing and siding, do not require straightening horizontally nor for twist. A pair of simple flat guides is usually sufficient to prevent curving up or down. Roller type straighteners are used sometimes, but they are not adaptable to all shapes.

It is important for operators to bear in mind that guides are mainly intended for guiding the metal, and should never be used for correcting inaccuracies in roll set-up and alignment. Buckling or waviness of the finished section frequently results from disregarding this fact.

The guides are machined from various kinds of metal, depending on the kind of metal to be formed, with a view to obtaining the best wearing qualities of these parts, as well as to reduce the friction between them and the metal being formed. Thus bronze may be chosen when forming stainless steel, and hardened steel when forming brass.

Besides the guide type accessories described, certain auxiliary machines are often required in connection with roll-forming mills. Several of the most important of these auxiliaries—automatic cut-off machines, resistance-weld pipe and tube mills, and rotary gang slitters—will be described in the next installment of this article; other devices for coiling, curving, embossing, ring forming, and making lock seams on light tubing will be covered in subsequent installments.

The Tool Engineers' Show

Machines must have tools to be of use in the metal-working industry. It is only after machine tools have been provided with cutters, presses with dies, welding machines with electrodes or torches, and so on, that machines can be applied in the manufacture of useful products. In high-production operations, jigs and fixtures are necessary to insure interchangeable manufacture. Many more accessories are utilized to speed up production on the primary equipment.

Tool engineers, through their job of putting machines to work, have played an important part in developing the present high plane of production of the American metal-working industry. With today's problem of turning out more products than ever before, at the lowest possible costs that can be attained with the present high material prices and labor wage rates, capable tool engineers become increasingly necessary. It is their responsibility to see that the most efficient methods are employed.

Therefore, it is of especial importance, that tool engineers keep themselves fully informed concerning all new tools, machines, and processes that will help them solve their production problems. One excellent opportunity for doing so is being afforded by the Sixth Annual Industrial Exposition of the American Society of Tool Engineers, which will be held in Cleveland from March 15 to 19, inclusive. Approximately 250 firms have already contracted for 75 per cent of the available space in the Cleveland Auditorium, which forecasts an unusually successful Show. Latest developments in tools and processes will be exhibited to the nation's top production men and tool and machinery buyers who will attend the Show. Tool engineering will be on display!

Coincidental with the Show will be the sixteenth annual meeting of the Society, at which a considerable number of papers will be presented by technical experts that will give tool engineers and production men much practical information applicable in their daily work.

The greatest problem facing the metal-working industry today is how to increase man-hour productivity. Although a number of troublesome factors are involved in the solution of this problem, one of the most important things to do is to utilize the modern machines and tools that have become available since the war. The Tool Engineers' Show will point the way.

Charles O. Herb

EDITOR

Whitman & Barnes Celebrates One-Hundredth Anniversary

WITH the arrival of 1948, Whitman & Barnes has rounded out a century of service to the mechanical industries of this country and throughout the world. This firm is known primarily as a manufacturer of twist drills, but during its one hundred years in industry, Whitman & Barnes has manufactured mower knives, lawn mowers, edge tools, chisels, rubber horseshoes, ice tongs, wrenches, and cotter-pins—to mention a few of their many products. Twist drills were first manufactured in 1891. Other cutting tools were subsequently added, but as events later proved it to be advisable to concentrate wholly on tools for the cutting, drilling, and piercing of metals, all other products were dropped. At the start of the twentieth century, Whitman & Barnes was recognized as one of the largest producers of forgings. However, in 1920, the forging division was sold to J. H. Williams & Co.

The history of Whitman & Barnes dates back to 1848, when, in Fitchburg, Mass., Albert Page set up a business to manufacture knives and other cutting tools intended primarily for America's growing agricultural industry. Six years later, he was joined by Augustus Whitman, forming the partnership of Page, Whitman & Co., which later became known as the Whitman & Miles Mfg. Co. In 1877, a merger was formed with George Barnes & Co. of Syracuse, N. Y. It was then that the names of Whitman and Barnes were first joined as the Whitman & Barnes Mfg. Co.

In 1926, the Whitman & Barnes Mfg. Co., which was located in Akron, Ohio, consolidated with the Detroit Twist Drill Co., and all manufacturing facilities were then centered at Detroit, which is the company's present home and manufacturing site. In 1933, the company was further strengthened by the acquisition of the Latrobe Tool Co., a step which brought larger productive facilities.

Twist drills and reamers are now the company's two main products. During the last thirty years, the manufacture of cutting tools of these types was revolutionized. In the development of automatic milling machines and other specialized equipment, which not only brought about lower manufacturing costs but also improved quality, Whitman & Barnes engineers and production men made it possible for the company to become one of the largest manufacturers in the industry.

Recognizing that punches are used to a large extent in the manufacture of automobile frames and bodies, radio cabinets, railway coaches, etc., Whitman & Barnes entered the punch field in 1928. Punches of the interchangeable type, and retainers, are made under the trade name of "Hercules." Other products of the company include interchangeable counterbores; countersinks; screw extractors; arbors; mandrels; insert centers with high-speed points; carbide-tipped twist drills for cast iron, non-ferrous metals, hard metals, glass, and masonry work; and carbide-tipped reamers and lathe centers.

At the start of its second century of operation, the company is in the process of constructing a new plant and office near Plymouth, Mich.

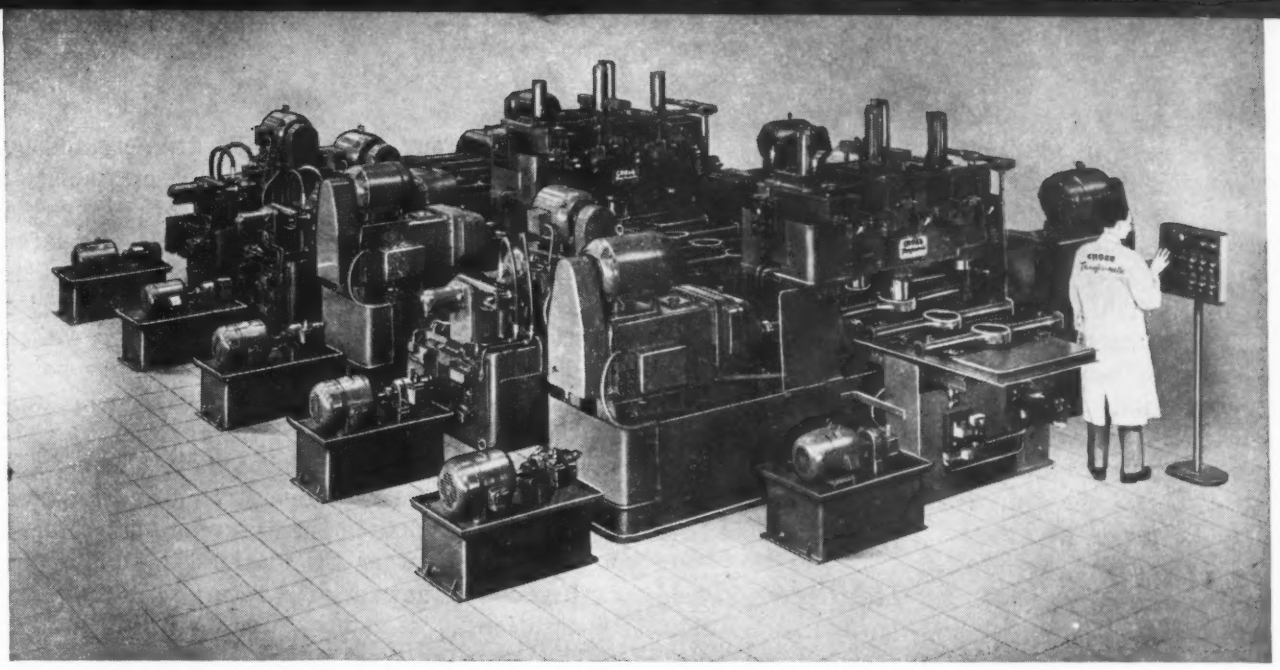
* * *

Portable Laboratory for Checking Materials

In order to improve the speed and convenience with which production materials can be checked against specifications, the Ford Motor Co. recently put in operation a portable laboratory that can be transported to the various sections of the plant where the material is located. This laboratory, which was described in a paper presented by Henry Tuttle and George Nahstoll at the annual meeting of the Society of Automotive Engineers, consists of a standard panel delivery truck on which are mounted a semi-portable spectroscope; chemical spot test kits; apparatus for the determination of carbon by color; a portable high-speed grinder for spark testing; hardness testers of the Brinell, Rockwell and scleroscope types; and a magnetic plating thickness indicator.

Electrical power of 220 volts, direct current is furnished from a 3-kilowatt generator, which, in turn, is driven by a power take-off unit mounted on the truck transmission. A control panel, located above the center of the workbench, permits remote control of the electrical circuits, and an auxiliary starter button and ignition switch on this panel can be used to start and stop the truck engine.

At present, the laboratory is being used to check or sort ferrous or non-ferrous stock; identify or test the physical and chemical properties of semi-finished or fabricated parts; and inspect and grade steel scrap and raw materials.



High-Speed Machining of Rear-Axle Housings on a "Transfer-matic"

For the First Time, Automotive Rear-Axle Housings are being Bored, Turned, and Faced on Completely Automatic Transfer Type Equipment Developed by The Cross Company. Twenty Axle Housings are in the Unit at One Time, Two Housings being Machined Simultaneously at Each Station

AUTOMOBILE rear-axle housings are now being machined at the rate of 150 an hour on a transfer type of machine operated by one man. This machine—known as a "Transfer-matic"—was designed and built by The Cross Company, Detroit, Mich., and consists of five independent double-end machine tools, each of which is equipped with a two-spindle head at both ends. All of these machines are synchronized to function together in conjunction with an automatic self-contained transfer unit.

The rear-axle housing is fabricated by welding together tubing and shapes of S A E 1025 steel. This housing is of new design, and has not here-

Fig. 1. Loading Station and First Machine of a "Transfer-matic" Employed for Machining Both Ends of Automotive Rear-axle Housings

tofore been in production, so that comparisons cannot be made with previous production rates. However, to machine an equal number of similar rear-axle housings with conventional equipment, at least five separate machine tools, each tended by an individual operator, would be required.

Idle stations are provided between the machines for accessibility and to permit modifications to suit possible changes in the design of the axle housing. The use of quickly removable self-contained units and flange-mounted valves, as well as the convenient location of valves and switches, greatly reduces the maintenance problem.

The seventeen electric motors employed develop 176 H.P., and thirty-two tools simultaneously cut the parts. Clamping and transferring of the work and feeding of the tools are accomplished by means of forty-four hydraulic cylinders. Over five miles of wire is employed for interlocking and automatically controlling all operations.

After being manually loaded, the two axle housings at the station shown in the foreground of Fig. 1 and at the right in the heading illustration are automatically lifted vertically by the transfer mechanism, advanced from one machine to the next, located, hydraulically clamped, and machined. Twenty housings are on the line at all times—two at each of the five machines, two in between adjacent machines, and two at either the loading or unloading station.

The transfer mechanism consists of elevating units mounted on the floor between the five machines. All four of these units are actuated by a single hydraulic cylinder that operates a series of racks and pinions. The elevators support a pair of rails, extending the length of the transfer line, which act as ways for a carrier that is moved back and forth horizontally. This carrier has twenty sets of approximate locators, which hold the parts in position while they are being transferred. In transferring, the carrier is automatically raised by the elevators, thereby lifting all twenty parts simultaneously. The carrier is then moved forward one station and lowered to deposit the parts in the fixtures of subsequent machines or between the machines. During the cutting cycle, the carrier is returned to the pick-up position.

The transfer mechanism simply moves the parts; it does not locate the work in any of the machines. Accurate location is accomplished by work-holding fixtures which are an integral part of each individual machine. This eliminates the need for keeping the machines accurately aligned with relation to each other.

At the first machine (Fig. 1) both ends of two axle housings are rough-bored, as indicated at *A* in Fig. 2. The housings are located endwise by hydraulically actuated plungers that are centrally located on a bridge above the work. After each plunger has descended into the "banjo" hole in the housing, two opposed locating plugs in the plunger are projected horizontally outward until they contact both sides of the "banjo" hole.

The housings are clamped at both ends by self-centering jaws. The clamps for these jaws

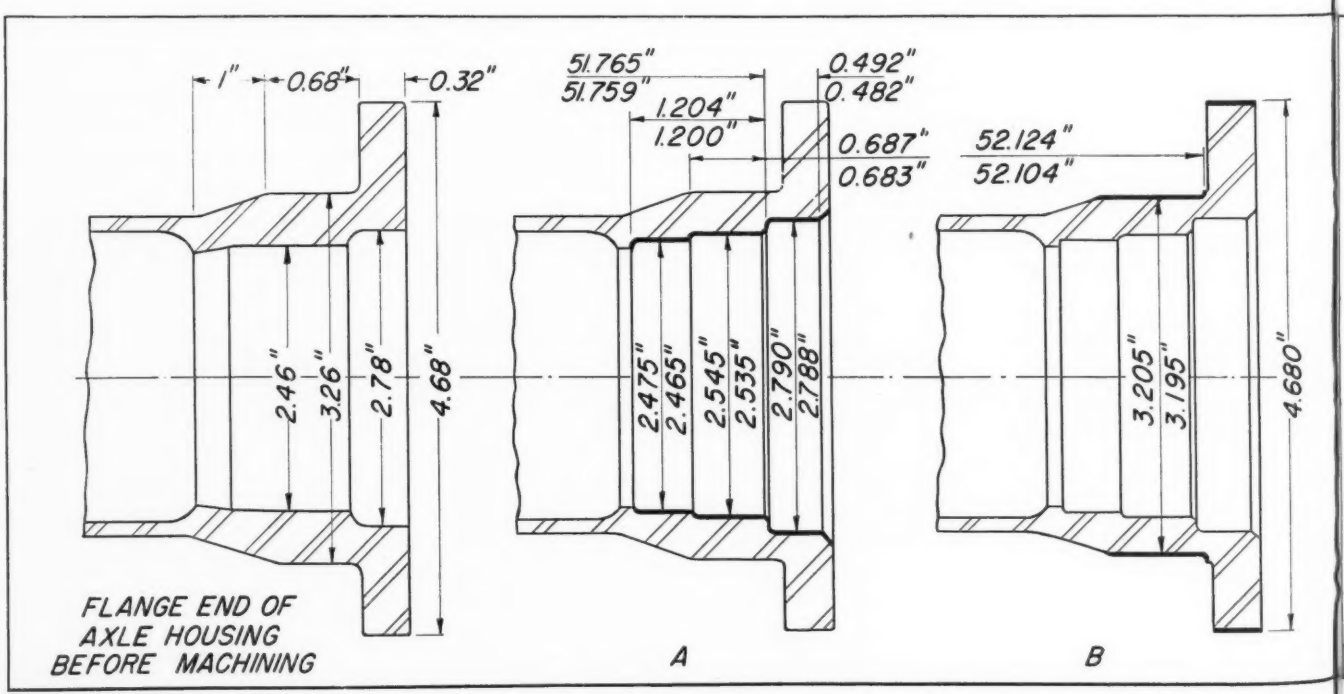


Fig. 2. Sequence of Operations Performed on the Flange Ends of

are also fed downward by hydraulic cylinders located on the overhead bridge. Four multiple-tooth, carbide-tipped boring cutters are rotated and fed by two Cross, double-spindle way type feed units, mounted on opposite ends of the machine bed. The tools are rotated at a cutting speed of 250 surface feet per minute, and fed at the rate of 0.018 inch per revolution. Maximum depth of cut is 0.062 inch.

The second machine in the line is a double-end turning machine equipped with rotating tools for finishing the outside diameter of the end flanges and the bolt clearance diameters of the housing adjacent to these flanges, as indicated at *B* in Fig. 2. A close-up view of one of the rotating tool-heads of this machine is shown in Fig. 3.

Four plungers, each located in the center of a rotating work-head, are advanced hydraulically into the rough-bored bearing seats at both ends of the two housings to locate the housings axially. Two floating jaws are pivoted hydraulically to grip each housing around the outside of the "banjo" surface and prevent it from rotating.

Two carbide-tipped, single-point tools are mounted in tool-blocks on the hydraulically fed cross-slide of each rotating tool-head. These tools are rotated around the stationary work at a cutting speed of 250 surface feet per minute, and fed across the work at 0.012 inch per revolution. The depth of cut is about 0.062 inch.

The third machine is a duplicate of the first, and is used to semi finish-bore the wheel bearing seats, as indicated at *C* in Fig. 2. Here the axle housings are again located endwise by plungers and plugs that enter the "banjo" holes. In addition, however, the parts are located axially by chuck jaws that grip the bolt clearance diameters turned behind the end flanges in the second machine. Multiple-tooth, carbide-tipped boring cutters are employed at the same cutting speed as in the previous machine. The depth of cut, however, is reduced to 0.011 inch, and the feed to 0.010 inch per revolution.

The fourth and fifth machines are employed for rough- and finish-facing the end flanges, as

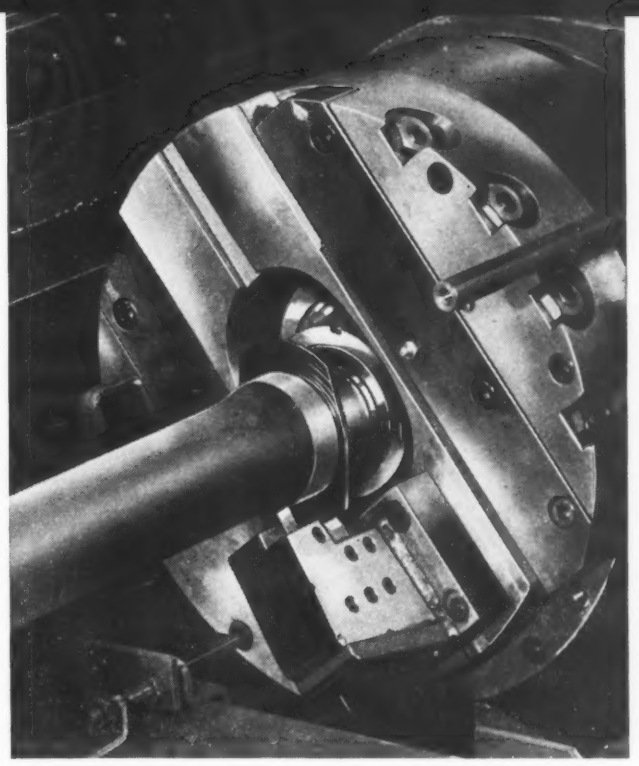
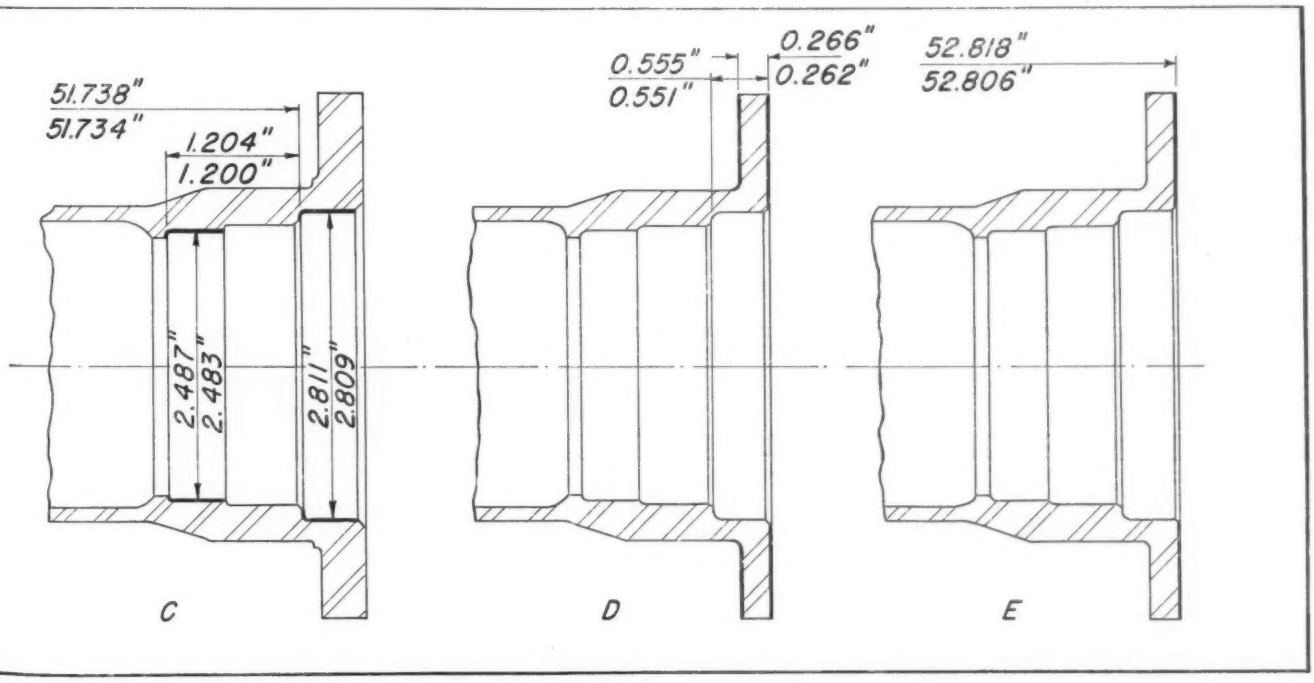


Fig. 3. The Stationary Axle Housing is Turned by Hydraulically Fed, Rotating Tools



Axle Housings by the "Transfer-matic" Shown in Heading Illustration

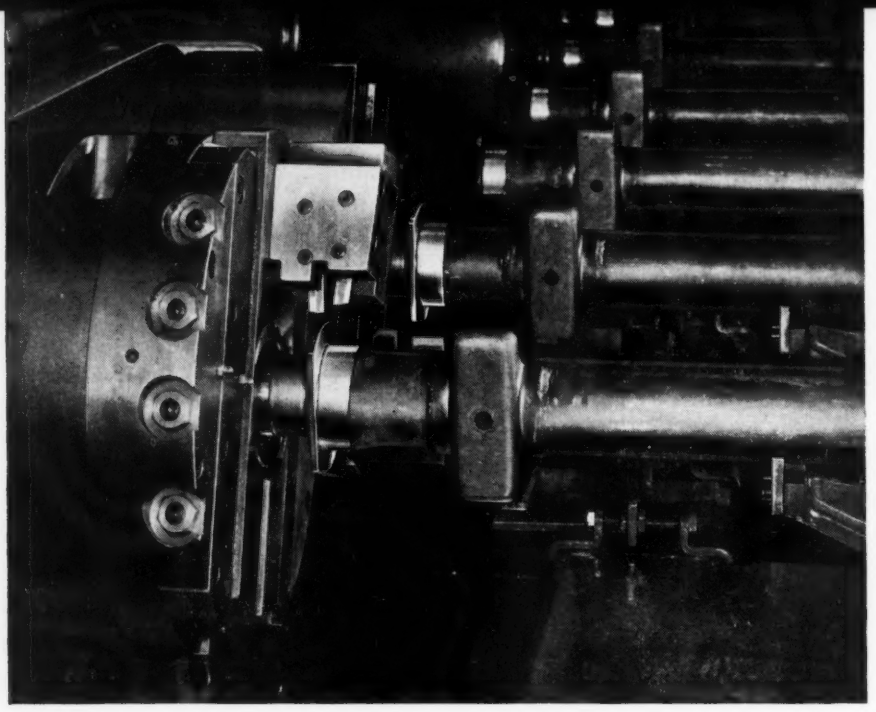


Fig. 4. (Left) At the Fourth Machine the End Flange of the Axle Housing is Straddle-faced by a Pair of Single-point, Carbide-tipped Tools

Fig. 5. (Below) View of Unloading End of "Transfer-matic." Axle Housing Ends are Later Diamond-bored

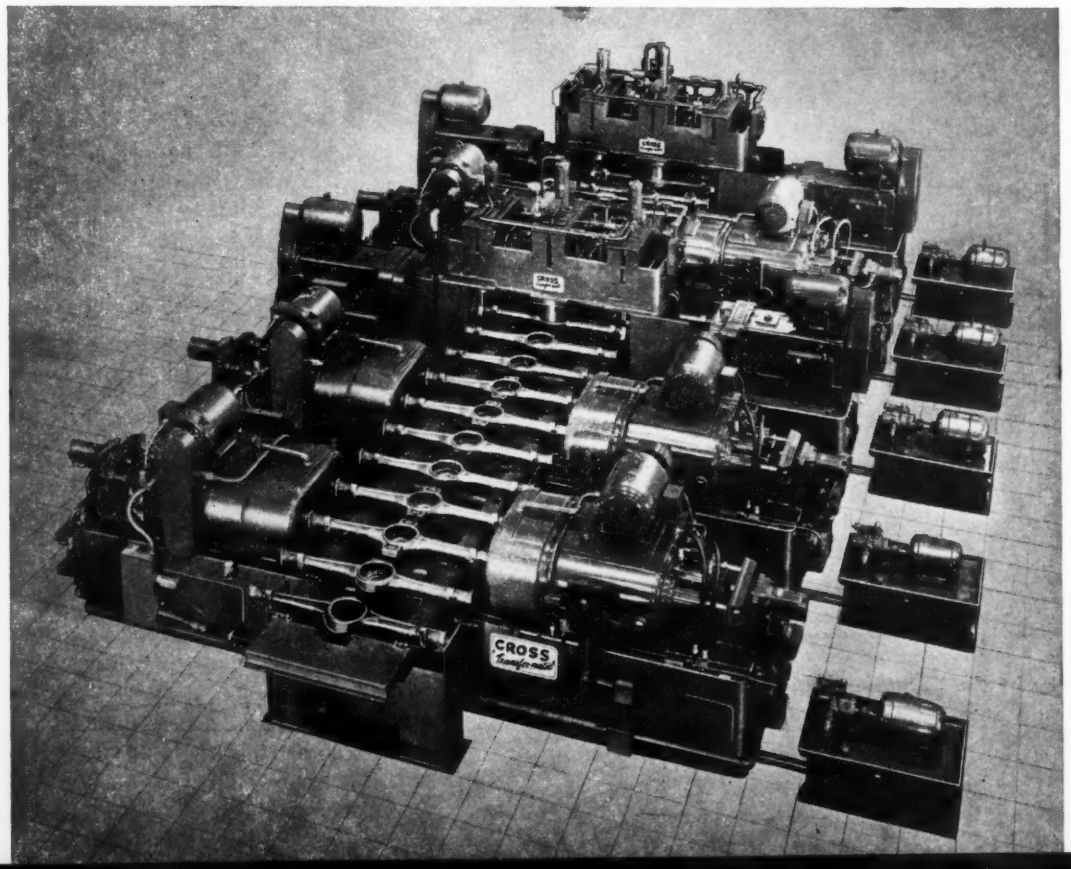
indicated at *D* and *E* in Fig. 2. In this case, the housings are located axially by plungers hydraulically fed into the bearing seats, Fig. 4, and are prevented from turning by floating jaws clamped around their "banjo" surfaces.

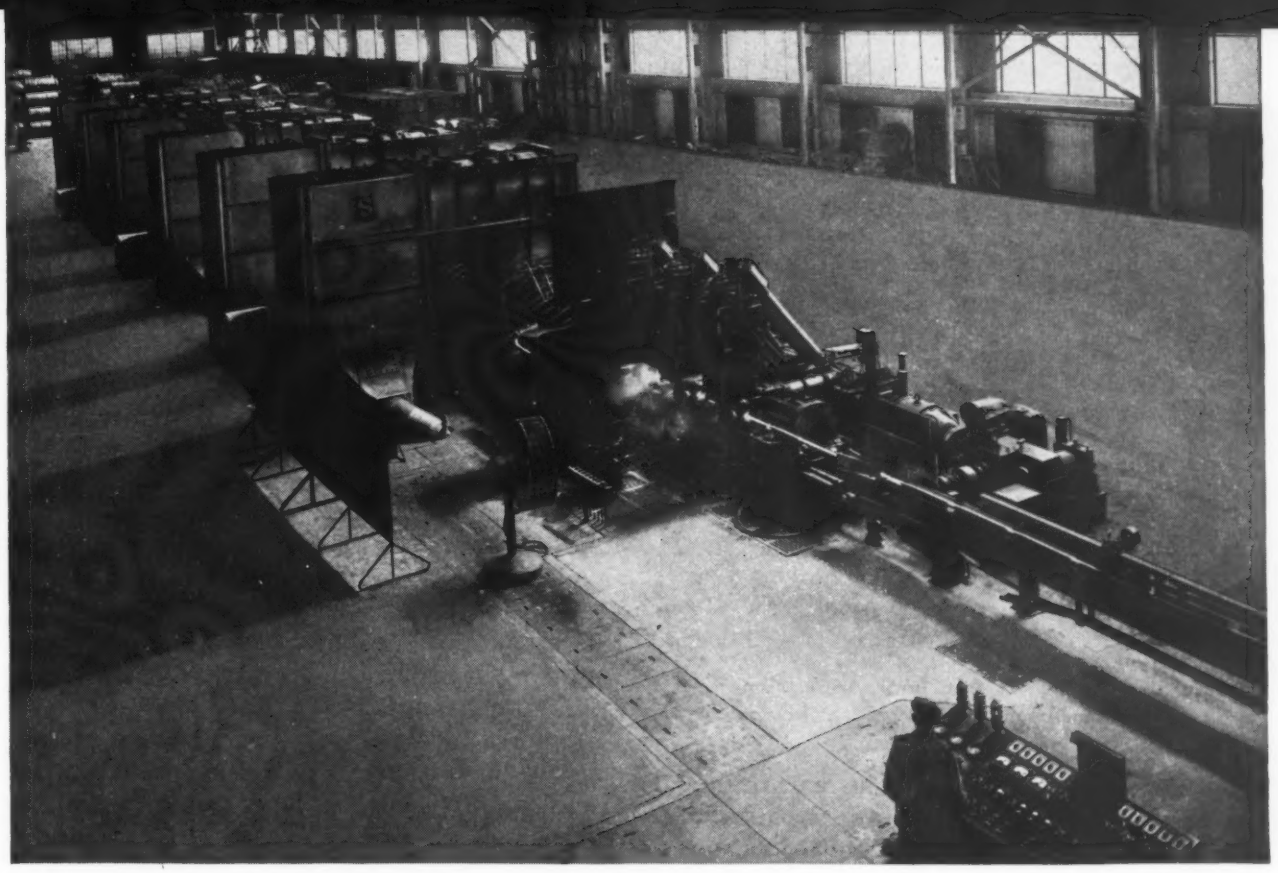
Single-point, carbide-tipped tools are mounted on the hydraulically fed, rotating cross-slides of these machines. Two tools are mounted on each rotating tool-head in the fourth machine, as seen in Fig. 4, for straddle-facing the end flanges. On the fifth machine, a single tool is used on each head to finish-face the outside surfaces of the flanges.

While rotating around the stationary work at a cutting speed of 250 feet per minute, the tools are rapidly advanced to cutting position and then fed toward the axes of the housing at the rate of 0.015 inch per revolution. The maximum depth of cut is 0.062 inch on the fourth machine, and 0.015 inch on the fifth machine.

A view of the complete machine, taken from the rear or unloading end, is seen in Fig. 5. A conveyor can be readily applied to this end of the machine for carrying the axle housing to some other machine. The only subsequent operation is diamond boring the housing ends.

Coolant and chips from all machines are handled through a centralized system. A trench beneath the floor extends the entire length of the "Transfer-matic." After the chips have been separated from the coolant, they are automatically conveyed to a disposal point.





What the User Should Know About Tubing

By E. J. DeWITT
Wallace Tube Co., Chicago, Ill.

Successful Application of Tubing Depends on Knowledge of the Types that are Available and of the Methods that are Employed in Making Them. This Article Describes the Principal Classifications, Characteristics, and Fabrication of Tubes — First of Two Installments

THE uses for tubing in product design and manufacture are almost unlimited. It can be applied as a structural member to support machine parts or it can be used to carry gas, air, steam, water, oil, or other fluids. In many cases, it can be employed for dual purposes—as a structural part and also to transport a fluid.

For each of these uses, the correct type and class of tubing must be specified, or else the application will result in failure. Such a choice is not simple, as there are many types, sizes, and classes available. It is only by having a knowledge of the characteristics of each and the method by which it is manufactured that the proper type can be chosen.

Classifications of Tubing

The various kinds of tubing available can be divided into two general types—tubes with welds or seams and tubes without welds or seams. Each of these types are subdivided into three classifications, namely, pipe, mechanical tubing, and pressure tubing. Alloy tubing and oil country goods are further divisions of these three classes.

There may be some question as to the inclusion of pipe in a list of tubing, but broadly speaking, pipe is tubing made to a certain standard; it is generally designated by the nominal inside diameter. It has a fixed wall thickness designated at the mill and by engineers as a schedule number, and referred to by tradesmen as standard, extra heavy, and double extra heavy. The nominal pipe sizes, weights per foot, and sizes of couplings for the various schedules can be found by reference to the catalogues of tube manufacturers.

Mechanical tubing, as its name implies, is designed and manufactured with mechanical uses in mind. Tolerances are closer than on any other common class of tubing. These closer limits save

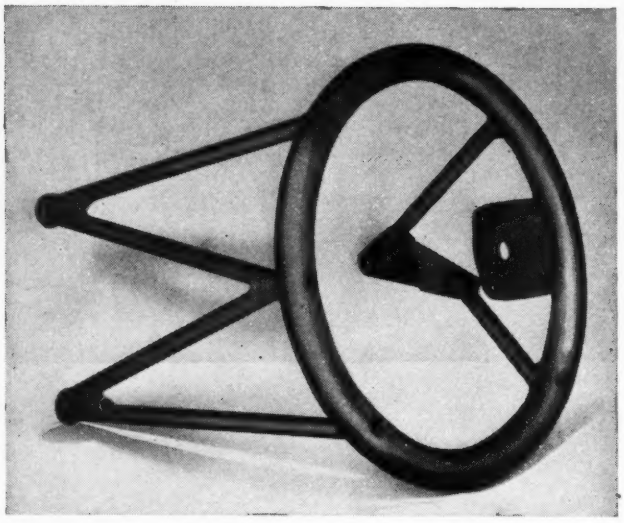


Fig. 1. A Typical Structural Application of Tubing is the Aircraft Engine Mount Illustrated

much time when the tube is to be machined, and make chucking in modern automatic screw machines feasible from the viewpoint of economy. Mechanical tubes are available in a wide range of sizes; before the War Production Board reduced the number of sizes to 528, some mills and warehouses listed between 1500 and 2000. Another advantage of mechanical tubing is that many grades are partially annealed to improve machinability after cold-drawing. The result is a tube with sufficient hardness to be machined without tearing.

Pressure tubing differs from mechanical tubing in many respects. First, being primarily intended for pressure uses, it is pressure tested; second, the dimensional tolerances are less restrictive; and third, most pressure tubes are fully annealed, since many applications involve working of the tube. For example, heat exchangers are rolled into tube sheets and boiler tubes are bent at sharp angles.

Alloy tubing is a subdivision of the classifications previously mentioned. It may be either alloy pipe, alloy mechanical tubing, or alloy pressure tubing. One of the best known of these is an alloy tube known as the S A E 52100 series. It is an alloy mechanical tube of highest quality and made to closer tolerances than most other mechanical tubes; it is the basic tube for bearing race manufacture. There is also the well known S A E 4130 series. This series of mechanical tubes gained wide usage during the war. Airplane parts, such as motor mounts, landing wheel supports, and other members were made from it. It is a mechanical alloy tube which is usually supplied in a normalized condition and can be heat-treated to produce great strength after it has been fabricated or welded. The aircraft engine mount shown in Fig. 1 is constructed of S A E 4130 material.

Stainless tube is another alloy tubing of considerable importance. It is also available in three classifications—stainless pipe, stainless mechanical tubing, or stainless pressure tubing. In most cases, it can be obtained in welded or in seamless types.

"Oil country goods" is a broad term covering a not too generally known but none the less large portion of all tubular products. Examples of oil country goods are pipe lines, oil-well casings, drill pipes, and others.

The Manufacture of Welded Pipe

Pipe is the cheapest form of tubing suitable for carrying a fluid or a gas, and is available either in the welded or seamless type. Four generally used processes are employed for making welded pipe: (1) Lap welding; (2) gas welding; (3) electric resistance welding; and (4) continuous butt welding.

The first process—lap welding—requires a preheating furnace long enough to handle strips

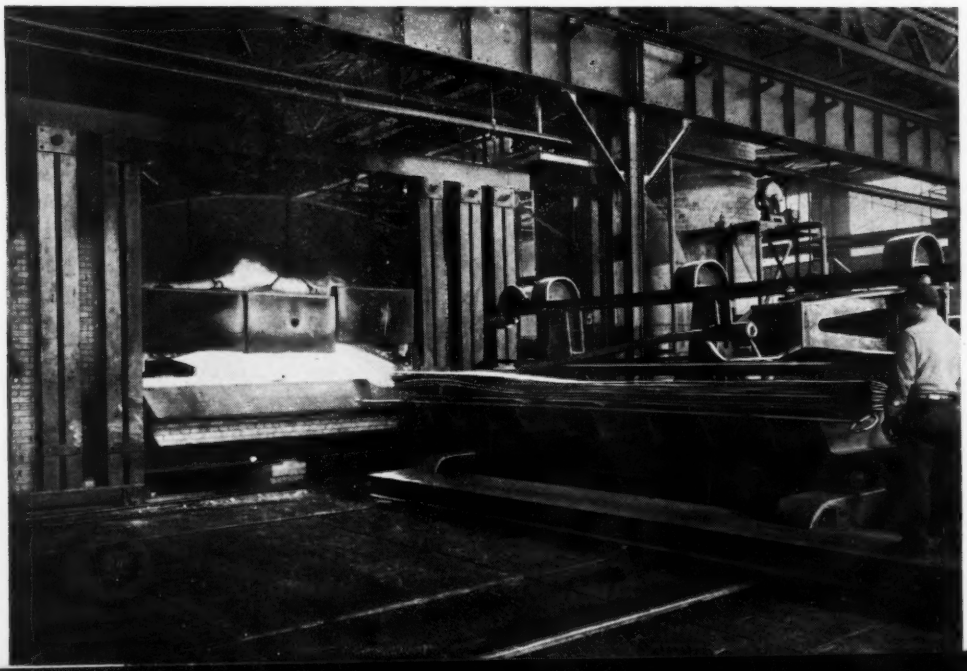


Fig. 2. Loading a Preheating Furnace for a Lap-welding Mill at the Sparrows Point, Md., Plant of the Bethlehem Steel Co. After being Heated, the Strip Stock is Formed into a Rough Tubular Shape in a Bending Furnace

of steel that are longer than the finished length of pipe desired. The furnace must also be wide enough to keep an adequate number of strips hot ahead of the welding unit. (See Fig. 2.)

The method of welding is the same as that used by the blacksmith. The two edges are lapped, and while at welding temperature, are squeezed or hammered. In making lap-welded pipe, the strip, or skelp, is heated and then formed by rolls to a rough tubular shape in a bending furnace.

The "pipe round," as the product of the latter operation is called, is reheated and welded in the welding rolls, which can be seen at the right of Fig. 3. The heavy drive mechanism used to operate these rolls is indicated at the left of the drive rolls. The incandescent pipe shoots out of the welding rolls into a trough, and then rolls down the rail shown at the front of the drive unit into the conveyor at the left of the motor. This conveyor leads through the first sizing roll, which is shown at the end of the conveyor, and then into the straightening machine located just left of the center of the photograph. From there it passes to the end of the line where it is cut, cooled, and inspected.

Lap welding, which is by far the oldest method of welding pipe, is rapidly becoming obsolete. Advances in other methods of manufacturing have now made it possible to produce pipe of like quality at a lower cost. Lap welding is limited to pipe sizes of 2 inches and over.

Gas welding requires much simpler equipment, and is the cheapest process to install. A strip, usually rolled in cold form, is placed on a reel at the end of a set of forming rolls. As the strip

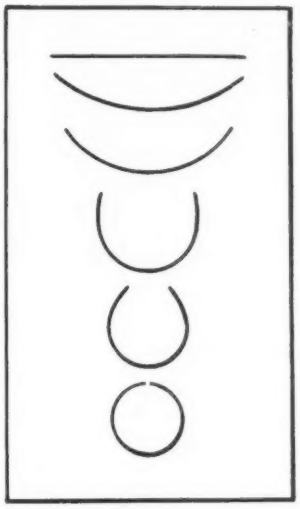


Fig. 4. A Series of Rolls is Used to Form Strip Stock into a Cylindrical Shape, as Shown. The Pipe is then Welded with Torches or Electrodes

is drawn through the forming rolls, its contour is changed from a flat to a circular shape as illustrated in Fig. 4. When the shape is fully round, the joint passes under a row of preheating gas torches that gradually build up the temperature of the joint to nearly the welding temperature.

A pressure roll, usually at right angles to the forming rolls, then squeezes the edges together; while the joint is under pressure, it is passed beneath an oxy-acetylene welding torch. A second pressure roll may be used in some processes to squeeze the weld area while a stream of cold water flows over the pipe to quench it.

Straightening rolls are usually incorporated in the line of pulling rolls, and an automatic cut-off device completes the unit. The automatic cut-off machine ordinarily is set to produce lengths of 21 feet to limits of plus or minus 1 inch.

Electric resistance welding, which is being increasingly used for smaller installations, is essentially the same as the gas welding process. The major difference is the use of a pair of water-cooled copper rolls as electrodes, which are so designed that a current of welding intensity is delivered to the edge of the tube. Pressure rolls restrain the soft edges until the weld area is quenched, and straightening and cutting operations complete the pipe. The discharge end of a forming and welding machine is shown in Fig. 5.

The continuous butt welding process, while costly to install, is the most economical of the

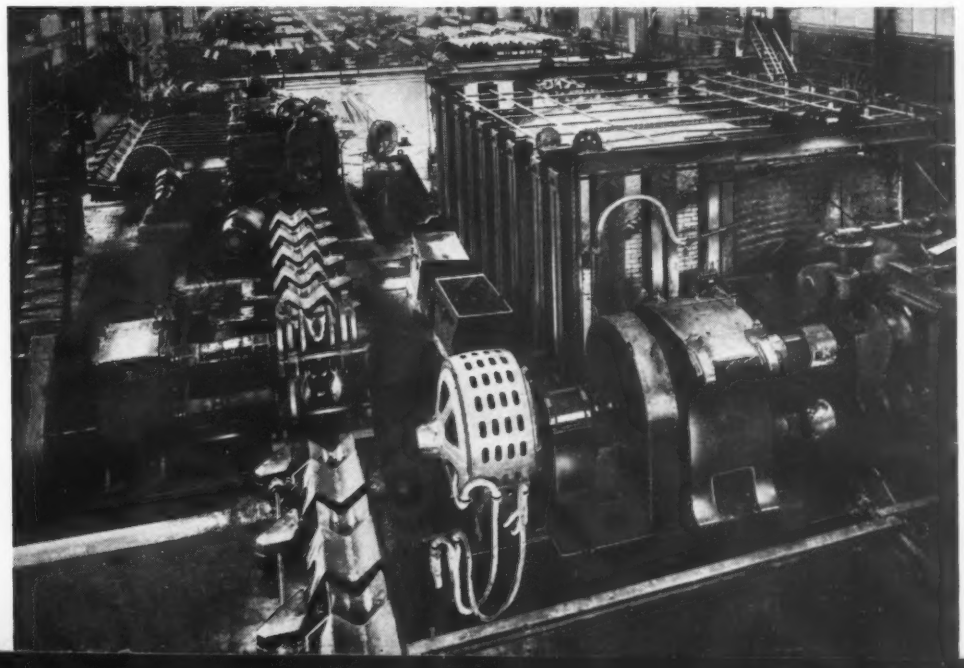


Fig. 3. General Arrangement of the Bethlehem Lap-weld Mill. The Pipe is Welded in Rolls at the Far Right of the Illustration, Straightened in the Machine Shown at the Left of the Furnace, and Finally Cut, Cooled, and Inspected

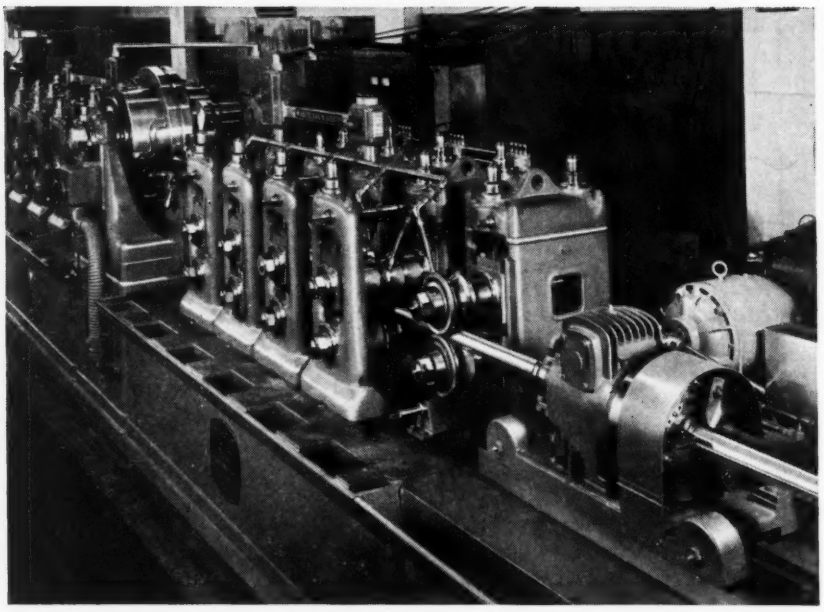
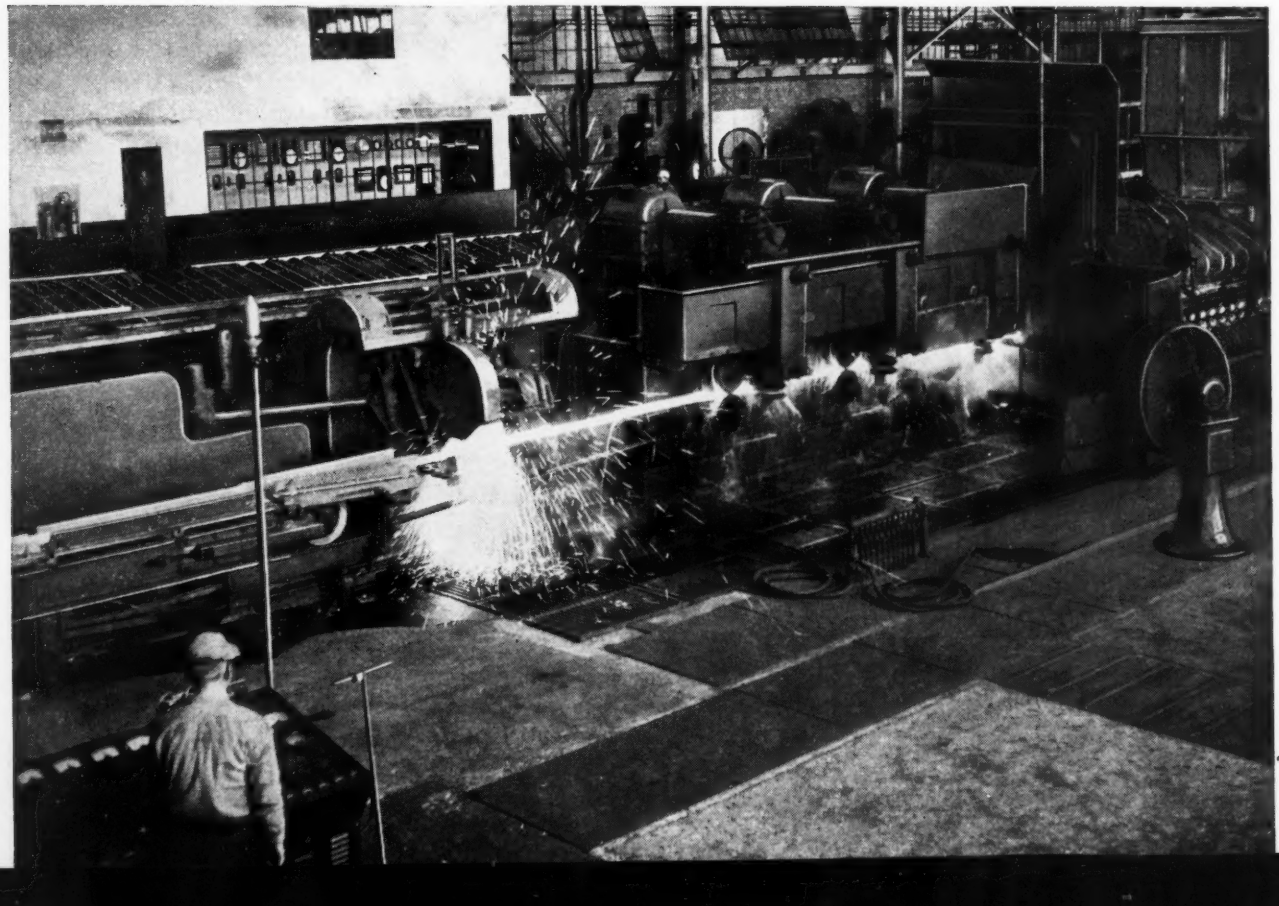


Fig. 5. The Discharge End of a Cold-forming and Electric Welding Machine Made by the American Electric Fusion Co. The Large Rolls at the Left are the Welding Electrodes; at the Far Right is the Cut-off Machine

pipe welding methods on account of the high production possible. The tube mill of the Bethlehem Steel Co. at Sparrows Point, Md., is shown in the heading illustration. The range of pipe produced on this type of mill is generally from 1/2 to 3 or 4 inches in diameter, and the production is about 30,000 feet per hour of 1/2 inch, Schedule 40 pipe.

The continuous welding process follows the general pattern of both gas and electric welding. Skelp is welded continuously end to end by an automatic butt-welding machine, and once welded, is allowed to loop itself on the floor before being fed into the furnace. It is this looping arrangement that makes continuous welding possible, for it gives time to butt-weld one coil of skelp to another without having to stop the flow of stock through the furnace. The skelp is brought up almost to the welding temperature by the long gas-fired furnace. Just outside the furnace, on the exit side, a pair of rolls is located. These rolls change the shape of the skelp form flat to round. After the skelp has been rounded, it moves to the weld area.

Fig. 6. The Automatic Cut-off Saw at the Discharge End of a Continuous Tube Mill Makes Twenty-five or More Cuts per Minute on Pipe Traveling at the Rate of 8 Feet per Second



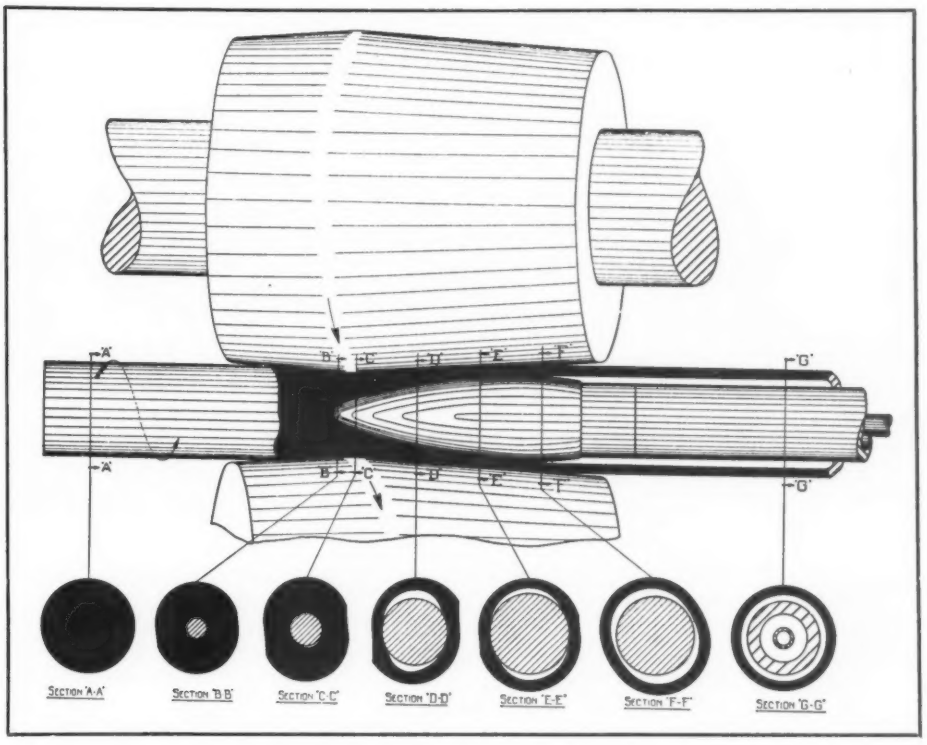


Fig. 7. Cross-sectional Drawing Showing Diagrammatically the Result of the Piercing Operation in the Manufacture of Seamless-steel Tubes—Courtesy National Tube Co.

The furnace does not heat the strip to the welding temperature. This is done by playing a stream of air or oxygen-rich air on the two edges of the skelp. The reaction of the air on the hot skelp is identical to the reaction of oxygen used in a cutting torch. The hot steel in the area affected becomes fluid and is squeezed in pressure rolls to form a perfect butt weld while in this nearly liquid condition.

Visualize the skelp as it travels through the furnace and rolls at 500 feet per minute. This is the equivalent of approximately 8 feet per second. In about one-third second, the pipe is changed from a flat strip into a welded pipe.

The production of pipe at these high speeds is dependent upon the efficiency of the cut-off mechanism. Fig. 6 shows the automatic cutting-off machine in operation. Its ability to make twenty-five or more cuts per minute while the pipe is traveling at 8 feet or more per second is one of the major factors contributing to the present low cost of pipe.

The Manufacture of Seamless Pipe

Several different processes are used to make seamless pipe and tube, but they are sufficiently similar so that if one is described, the reader will understand them all. Whereas the processes described for making pipes with seams begin with a strip, the seamless pipe is made from a solid bar or "tube round." The "tube round" of carefully selected steel is center marked on both ends and is of a length calculated to produce a given footage of pipe. It is placed in a soaking furnace, where it is slowly brought up to a uniform temperature of proper value for hot working.

From the furnace, the "tube round" is positioned on the piercing unit of the hot mill, where it is forced by a set of spinning rolls over a piercing mandrel, as illustrated in Fig. 7, thus producing a rough hollow tube with a relatively even wall, of somewhat greater length than the original tube.

While still hot, the pipe moves on to a sizing roll that kneads it over a mandrel bar. The bar and the pipe then pass through a series of rolls that work it to the desired outside dimension. After this, the mandrel bar is stripped from the inside, and cooling, straightening, and inspection of the pipe follow.

The newer mills, now under construction, will have, in addition to the steps enumerated, a subsequent step called "stretch rolling." A stretch rolling mill will elongate and reduce. Thus it will be possible for the hot mill, for example, to deliver a 2-inch pipe to the stretch mill, which will automatically produce a 1 1/2-inch, 1 1/4-inch or, in some cases, a 1-inch pipe at greater speeds than can be obtained by other methods.

* * *

The number of women in factory production jobs in this country now totals 3,100,000, or 25 per cent of the production force, according to the Bureau of Labor Statistics.

Broaching Mating Parts on One Machine

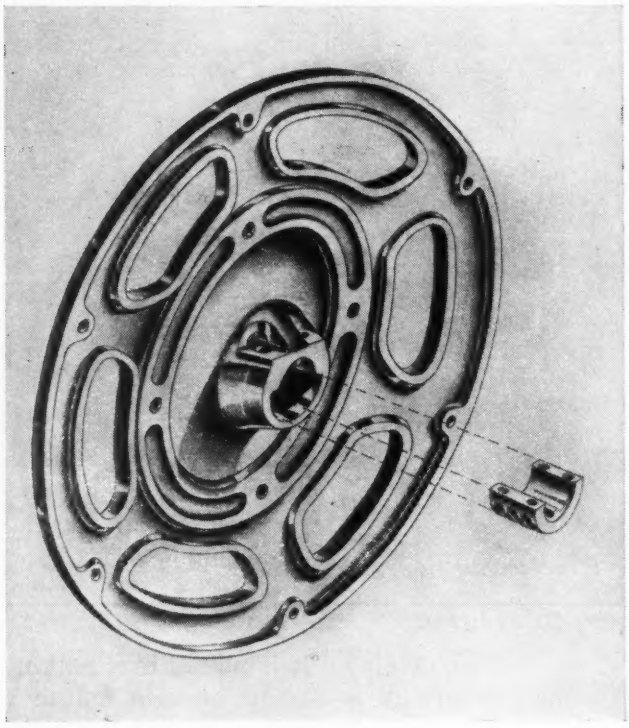


Fig. 1. Wheel Hub and Clamp, which are Broached Semi-automatically on a Colonial Horizontal Broaching Machine Equipped with Special Broach-handling and Work-clamping Devices

BY the use of special locating and clamping equipment, it is possible to broach two or more mating parts on the same machine and with the same tool. One installation of this type, in the plant of a large tractor company, is being applied to the machining of the tractor wheel hub and hub clamp shown in Fig. 1.

The wheel hub is large and difficult to handle, whereas the clamp is relatively small. Tolerances are plus or minus 0.002 inch on the 2 5/16-inch diameter hole, and the bore must be concentric with the outside diameter.

The equipment employed for this job is a broaching machine of 25 tons capacity, made by the Colonial Broach Co., Detroit, Mich. This machine has a 90-inch stroke, and is equipped with a built-in fixture for broaching the wheel hub, an accessory fixture that can be mounted on the machine for broaching the hub clamp, and a sectional "internal surface" broach. A horizontal machine was selected because the large part could more easily be loaded on it and because it provided the means of effecting a simple change-over from one part to another.

Additional features of the broaching set-up are shown in Fig. 2. These include a semi-automatic broach-handling mechanism; semi-automatic clamping and automatic locating devices; and a shuttling broach support at the end of the work to simplify loading of the large parts and

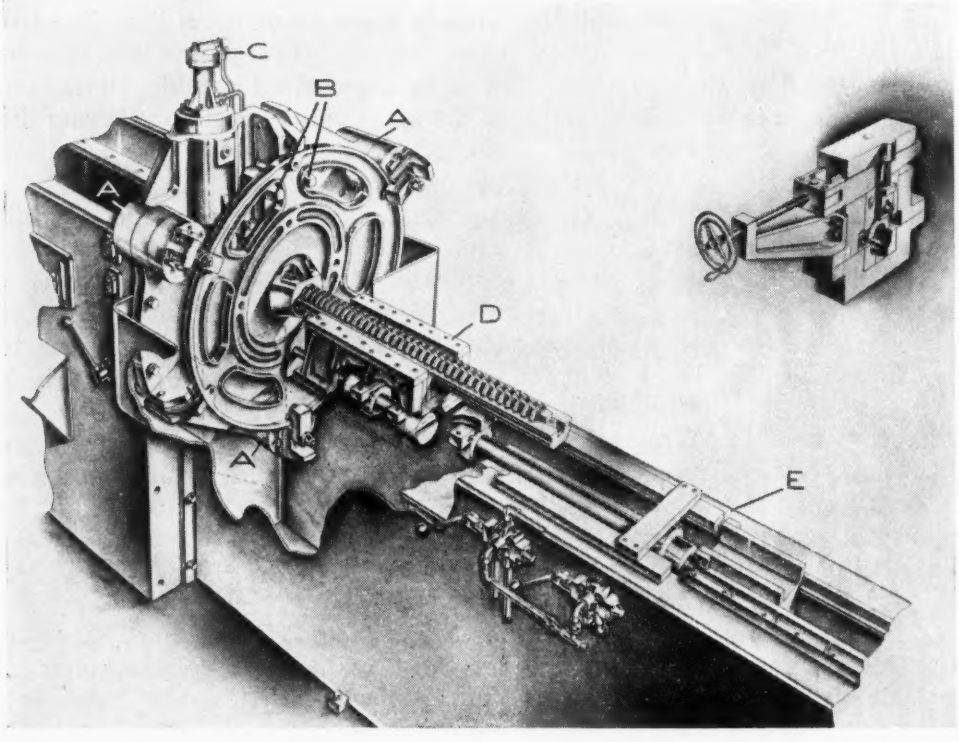


Fig. 2. Details of the Locating and Clamping Devices on Broaching Machine. The Small "Insert" Fixture (Right) is Mounted on the Machine for Broaching the Hub Clamp

to facilitate adding the fixture for broaching the small part.

In broaching the wheel hub, the three cylinders *A* operate the semi-automatic hydraulic clamp. Spreaders *B* are used for locating the hub from the web, and three equalizing fingers, actuated by the hydraulic cylinder *C* and operated simultaneously through a gear and rack mechanism, locate the hub with respect to the outside diameter. To facilitate loading, there is a space between the part and the shuttling broach support *D*. The action of support *D* is interlocked with that of the clamping cylinders, the operating cylinder for the shuttle being under the support. A semi-automatic broach-handling slide *E* is operated hydraulically by another cylinder below the slide.

The operating sequence is as follows: Cylinder *C* actuates the levers that locate the part. Cylinders *A* automatically clamp the part as shuttle *D* moves into position. A lever then actuates the broach-handling slide *E*, which pushes the broach through the work and into an automatic broach puller. When the broach has been pulled through, the part is automatically unclamped, and the shuttle returns to open the gap. The locating fingers retract and the part is removed. Finally, the broach is returned into engagement with the broach-handler *E*, which pulls the broach out of the way to permit another part to be loaded.

For broaching the hub clamp, the fixture shown in the separate view in Fig. 2 is slipped into the broaching machine without removing the main fixture. The back face of the clamp is located against a stop, and the parting faces are located on pins. Clamping is effected manually, with a handwheel. The tension spring shown on the fixture helps to unclamp the part after broaching.

As mentioned, the same broach, composed of inserts mounted in a broach bar, is used to broach the hub clamp and the wheel hub.

* * *

Ohio State University Establishes Welding Engineering Department

The establishment of a Department of Welding Engineering has been announced by Ohio State University, Columbus, Ohio. The department, which will be included in the College of Engineering, will offer undergraduate work leading to the degree of Bachelor of Welding Engineering, as well as advanced study for graduate engineers. Ohio State's College of Engineering has offered a course in this field for about nine years as a division of the Department of Industrial Engineering. The board of trustees has now authorized the establishment of the division as a separate department.

* * *

One fact stands out in bold relief in the history of man's attempts for betterment: When compulsion is used, only resentment is aroused, and the end is not gained.—*Samuel Gompers*

The New Liaison Plane of Army Ground Forces —the Boeing XL-15— Shown Here "Knocked Down" for Ground Movement, with the Wings and Tail Surfaces Attached to the Sides of the Fuselage, can be Assembled and Made Ready for Flight in Less than an Hour. It is Designed for Aerial Tow at Over 150 Miles per Hour and for Ground Tow at 40 Miles per Hour. An Airtight Cabin and Auxiliary Heating Equipment are Provided for Winter Operation

Engineering News

Machining 8½-Ton Forgings for Diesel-Engine Crankshafts

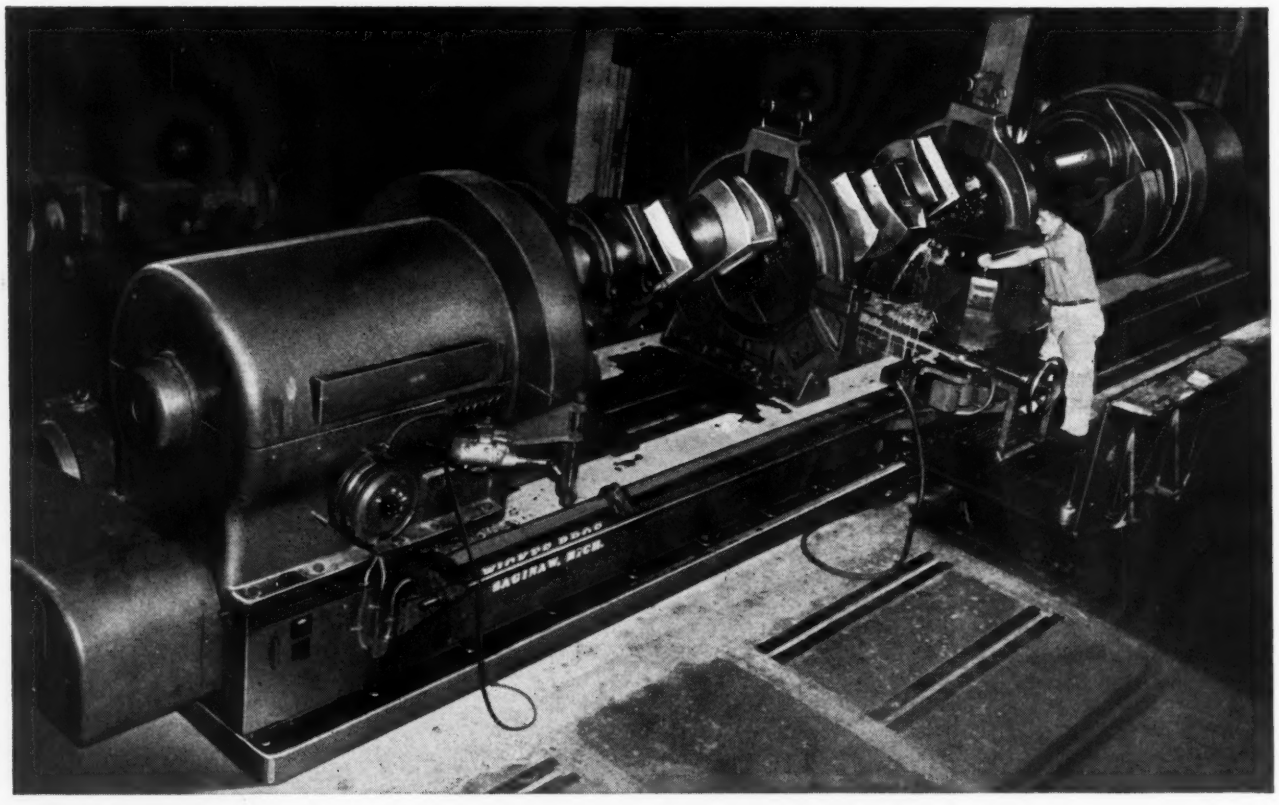
To machine 8 1/2-ton forgings for large Diesel-engine crankshafts, the Superior Engine Division of the National Supply Co., Springfield, Ohio, recently installed two heavy-duty Wickes lathes, one of which is shown in the accompanying illustration. These lathes are 45 feet long and weigh more than 100,000 pounds each. They remove approximately 2 1/2 tons of metal from rough forgings.

The machines are power-driven at both the headstock and tailstock, are equipped with variable-speed control, and have hydraulically operated carriage and cross-slide feeds. The crankshafts to be machined are mounted in pot fixtures adapted to the faceplates of both the headstock and tailstock, thus insuring rigid support and a more positive cutting action. The speed range of the machine is from 1 to 25 R.P.M., which permits a cutting speed up to 50 surface feet per minute. This speed is maintained regardless of the diameter of the work at the cutting point through a rheostat, operated in conjunction with the cross-slide feed, which automatically increases the spindle speed as the diameter decreases.

Diamonds Used to Measure Intensity of Atomic Radiation

Experiments at the National Bureau of Standards have resulted in the development of a diamond counter that will detect and measure smaller quantities of gamma ray radiation than has been possible with ordinary Geiger-Muller counters. The sensitivity of the diamond counter is practically independent of the amount of usage.

Radioactivity studies conducted by Dr. L. F. Curtiss show that a diamond placed in a strong electric field initiates sharp electrical pulses



One of Two Heavy-duty Wickes Lathes that have been Installed by the Superior Engine Division of the National Supply Co. to Machine Large Diesel-engine Crankshafts

Pole Core Plate for the 2000-ton Magnet of a Cyclotron is Turned and Faced on a Huge Boring Mill

when gamma radiation is absorbed, and, as with a Geiger counter, a count of the pulses gives an indication of the intensity of the radiation. Although diamonds have not yet been tested for beta radiation, it is expected that a similar effect may be observed in that case.

To use a diamond as a counter, it is clamped between two small brass electrodes, maintained at a difference in potential of about 1000 volts. When a source of gamma radiation is brought within range of the diamond, there occur across the electrodes pulses of current, which after amplification may be detected and counted by means of any suitable indicating device, such as an oscilloscope, a current meter, a set of earphones, or a loud speaker. In the apparatus assembled at the Bureau, primary amplification is effected with minimum loss of original intensity through the use of a triode very close to the diamond in the circuit. The output from this tube is applied to a two-stage amplifier, from which pulses of sufficient magnitude are obtained to operate the detecting instrument.

The general availability of industrial diamonds and the fact that the instrument can be easily constructed should make the new development of interest to scientists and technicians in the medical, biological, and industrial fields.

Parts Completed for a 2000-Ton Cyclotron Magnet

The huge yoke and pole pieces for the 2000-ton magnet of the cyclotron now under construction at Columbia University's new nuclear research laboratory were recently completed by the Bethlehem Steel Co., Bethlehem, Pa. The yoke is a rectangular assembly, 33 feet long, 21 feet high, and 14 feet 2 inches wide, with a window in which are placed the upper and lower pole pieces of the magnet. It is built of heavy forged-steel plates, bolted together. The ten top and the ten bottom plates weigh 60 tons each, while the five plates on each side of the assembly weigh 38 tons each. Each pole is made up of two 47-ton cylindrical core plates, 13 feet 6 inches in diameter by 16 3/8 inches thick, one shouldered pole plate weighing 43 tons, and two sets of interchangeable pole tip plates, 6 and 8 inches thick, respectively.

Production of plates of these dimensions required the use of a 7500-ton steam-hydraulic press. The ingots used were among the largest ever handled, weighing about 460,000 pounds each. The ingots were placed on the bottom of a furnace car and moved into a large furnace, where they were heated to more than 2000 degrees F. for shaping on the press.

In shaping the plates, the round fluted ingots were first placed in the press and squared. They were then worked from all sides until the desired rectangular cross-section had been attained. During this operation, it was necessary to return the piece to the heating furnace a number of times and reforge before the final dimensions were attained.

All plates, except the pole tip plates, were rough-machined and drilled for assembling with bolts. The pole tip plates were machined to very close tolerances and fitted with segment shims of intricate design. The vertical boring mill here illustrated, and the planers used for this work are among the largest in the country.

Materials of Industry

THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

Fiberglas High-Temperature Insulation Materials for Industrial Use

Owens-Corning Fiberglas Corporation, Toledo 1, Ohio, has developed a line of light-weight insulating materials which will withstand temperatures up to 1800 degrees F. Composed of specially processed filaments of glass, the new line is designed for industrial, marine, and aircraft applications where a need exists for a flexible, removable type of insulation that will withstand physical deterioration at extremely high service temperatures.

In felt or bulk form, the new high-temperature materials are suitable for insulating housings and flange covers of high-temperature steam turbines, as well as exhaust manifolds and turbo-supercharger housings on oil- or gas-fired supercharged four-cycle Diesel engines. In many other applications, they provide a removable and replaceable insulation that can take the place of the refractories that have up to now alone been available for insulating such high-temperature equipment. They can also be employed as the filtering element in fly ash separators used in high-temperature processing equipment. . . .201

Surface Treatment Extends Applications of Polystyrene

A new treatment which provides a mar-resistant surface and makes possible the use of low-cost polystyrene in applications previously requiring more expensive plastic materials has been announced by the Nash-Kelvinator Corporation, Detroit, Mich. The treatment, known as "Logoquant," is fully developed for production-line application, either by spraying or dipping. It does not require special equipment, nor curing at high temperatures. The treatment can be completed in fifteen minutes using standard equipment.

The Logoquant treatment imparts to polystyrene a mar resistance 18 per cent higher than that of untreated polystyrene and 7 per cent higher than that of a good spar varnish, being approximately equal to that of much more expensive plastics.

When marred, Logoquant treated polystyrene can be polished to clearness considerably more easily than untreated polystyrene. It is considerably less electrostatic than the untreated polystyrene and resists solvents which attack polystyrene, such as gasoline, mineral oils, carbon tetrachloride, and toluene. The Bee Chemical Co., Chicago, Ill., is being licensed to make the treatment available to polystyrene users. . . .202

Flux for Soldering Aluminum to Other Metals

All-State Welding Alloys Co., Inc., 96 W. Post Road, White Plains, N. Y., has developed a new flux, designated All-State No. 39 flux, which has particular value for joining aluminum with dissimilar ferrous and non-ferrous metals at very low working temperatures. Where this flux is used with aluminum solder, the joint has the advantage of being considerably stronger than a similar one made without the flux. Used in conjunction with All-State No. 39 aluminum solder, the high capillary action of the flux makes the solder flow rapidly throughout the fluxed portion of the work. 203

Coating on Stainless-Steel Sheet Eliminates Marring

Scratches, die marks, and other surface defects are minimized or entirely eliminated by a new plastic coating, known as "Liquid Coating," that is being applied to stainless-steel sheets by several of the steel manufacturers and fabricators. This coating, developed by Better Finishes & Coatings Inc., Newark, N. J., is said to be particularly effective during stamping, drawing, and forming operations. It not only minimizes surface marking, but also acts to reduce the power requirements in deep drawing operations. The plastic coating increases the efficiency of the lubricating compounds, and thus improves the tendency of the metal to flow under pressure.

The finish on a drawn part is equal to that of the original sheet.

The coating is applied by brushing, spraying, or dipping. It can be stripped from the part after any of the fabricating processes or can be left on to protect the surface during shipping or assembly. 204

Metal Cleaners for Steel, Zinc, and Aluminum

A new line of "Parco" metal cleaners has been introduced by the Parker Rust Proof Co., Detroit, Mich. The three classes of Parco cleaners for steel, zinc, and aluminum include emulsion types, acid types, and alkaline types. They are specialized cleaners to meet varying specifications and conditions, and are formulated to make hard water suitable for cleaning; rapidly remove soil from metal surfaces and prepare them for fine, dense Bonderite coatings; and remove rust and grease prior to painting....205

Metallizing Process Utilizes Powdered Alloy with Plastic Binder

A new method of hard-facing by using a metallizing gun and "Metco-Weld H"—a wire composed of a powdered hard-facing alloy extruded with a plastic binder—has been announced by Metallizing Engineering Co., Inc., Long Island City, N. Y. This Sprayweld method attains the previously difficult objective of applying smooth, uniform, relatively thin, hard coatings in a practical and inexpensive manner.

During the spraying operation, the plastic binder is completely volatilized and the deposit consists entirely of the metallic constituent. Subsequent fusing, with any fusing torch or with an attachment on a Metco metallizing gun, results in a coating alloyed to the base that is identical to hard-facings of the same alloy applied by other methods.

The alloy used in "Metco-Weld H" possesses excellent resistance to abrasion and corrosion. It combines a low melting point with a long range of plasticity (1850 to 2050 degrees F.). It also has high strength at red heat and exceptional resistance to oxidation. 206

Modified Sulphur-Chlorides Used as Cutting Oil Additives

Lubricants, Inc., Fisher Bldg., Detroit, Mich., has announced two new cutting oil additives—Cresol Z-2 and Cresol Z-2A—which are suitable for use in the production of cutting oil coolants; drawing compounds; and metal rolling, forming, and extreme-pressure lubricants. They are particularly adapted to the machining of Monel metal and steels of the chrome, chrome-molybdenum, chrome-nickel, tungsten, and so-called stainless types, and are also suitable for use where maintenance of size, finish, and long tool life are of importance.

These additives are modified sulphur-chlorides and contain as high as 40 per cent sulphur and 30 per cent chlorine. Due to their chemical composition, the products are very stable, do not stain ferrous metals, and do not gum or decompose when used as suggested. When added to light mineral oils, preferably light paraffin, the resultant product is transparent and makes possible observation of work being machined or fabricated. 207

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on these pages, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning name of material as described in February, 1948, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

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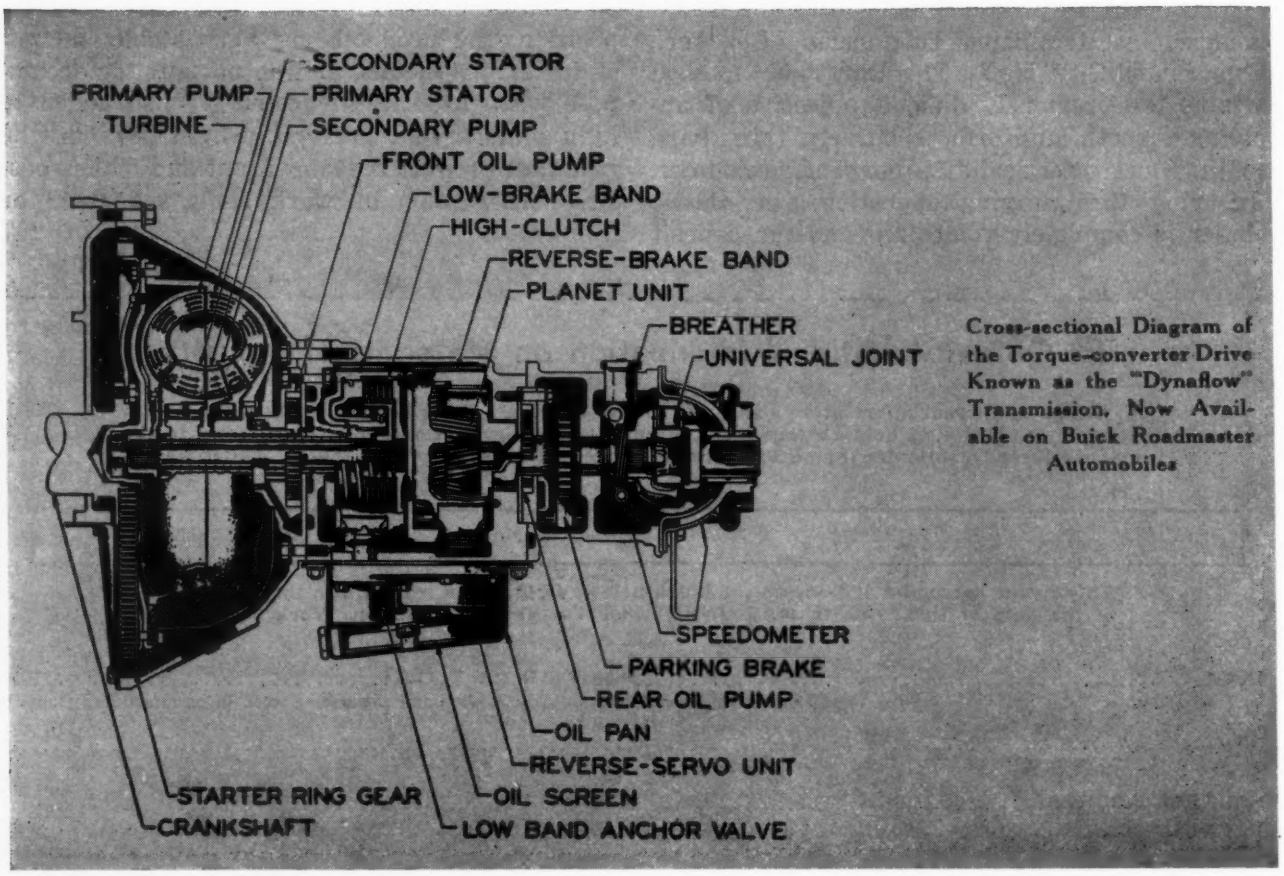
Torque-Converter Drive for Buick Automobiles

SLIDING gears are entirely eliminated in the new Dynaflow transmission now available on Buick Roadmaster automobiles. This transmission is an outgrowth of the Torqmatic transmission supplied on the "Hell-Cat" tank destroyer built by Buick during the war. The design is such as to provide maximum engine performance over the entire range and smoothness of operation during starting, acceleration, and deceleration.

The constructional details of this mechanism are of interest. The major components are: (1) A torque converter which is capable of torque multiplication under certain conditions and which acts as a simple fluid coupling under other conditions; (2) a planetary unit that provides a direct drive, an emergency low speed, a reverse, and a neutral position; (3) an oil supply for lubricating the torque converter and for operating the hydraulic control system; (4) two pumps—one at the front, which is driven by the engine, and the other at the rear, which is driven from the propeller shaft; (These pumps circulate the oil and provide the pressure necessary for the hydraulic control system.) (5) the hydraulic control system; and (6) an oil cooler for maintaining the oil supply at the desired operating temperature.

The torque converter is composed of five independent rotating members—a primary pump, secondary pump, turbine, primary stator, and secondary stator. There are two pump stages and two stator or reaction member stages. The blades of the reaction members are curved in the reverse direction to those of the pump and turbine, so as to effect a reversal of fluid flow.

The primary pump is bolted to the flywheel and always turns at the crankshaft speed. The turbine is energized by this pump and turns the input shaft to which it is splined. Each of the three rotating elements is individually mounted on an over-running clutch mechanism, which permits free rotation under certain conditions, but holds them in a fixed position under other conditions. Thus, the two stators are rigidly fixed to the case when torque multiplication is



Cross-sectional Diagram of the Torque-converter Drive Known as the "Dynaflow" Transmission, Now Available on Buick Roadmaster Automobiles

required, but run freely when the converter operates as a fluid coupling, which it does when the propeller shaft speed is approximately 85 per cent of the engine speed. In contradistinction, the secondary pump is arranged to free-wheel and over-run the primary pump during torque multiplication, but becomes fixed to the primary pump and rotates with it when the converter attains the fluid coupling range.

In starting the automobile, the primary pump, being driven directly from the flywheel, absorbs the full torque of the engine. At this point, the secondary pump is running faster because the rapid vortex flow through the vanes discharges oil from the turbine with such high velocity as to force it to rotate faster than the pump wheel. If the secondary pump moved at the same speed as the pump wheel, or slower, the reaction of the vortex flow would result in turbulence, with a consequent lowering of pump efficiency.

Once the steady-driving or high-speed operation has been reached and the converter functions much like the usual fluid coupling, the vortex flow is at a minimum, since smooth fluid flow has been established, and the pressure on the back of the secondary pump vanes has disappeared. Now the fluid coupling is carrying full torque, which requires cooperation of both the primary and secondary pumps. This is achieved when the secondary pump stops overrunning and becomes locked to the primary pump housing through the action of the free-wheeling clutch. The pressure of the oil stream under these conditions serves to lock the clutch so that both pumps can rotate in unison.

The two stators function in starting, under heavy loads, and during acceleration. This requires a maximum of torque multiplication which is effected through torque reaction in the stators. During this phase, there is the rapid vortex flow of fluid previously mentioned, which results in high forces being exerted on the stator vanes. This condition locks the free-wheeling clutches and binds the stators to the reaction shaft, the latter, in turn, being held solidly in the transmission case.

The Dynaflow transmission is capable of a torque multiplication corresponding to a gear ratio of around 2.24 to 2.4 to 1, which is comparable to the normal low-gear ratio in a conventional transmission. However, the new transmission constitutes, in effect, an infinitely variable speed transmission. Under light loads and steady driving, the converter operates fully as a fluid coupling without torque multiplication.

The transmission includes a planetary gear unit whose function it is to provide a direct drive, emergency low speed, reverse, and neutral position. This unit consists of a driving sun gear, a low range reaction gear with band, three low planet gears, three reverse planet pinions, a reverse gear and band, and a planet carrier. All the gears are of the helical type. Supplementing these elements is a hydraulically operated multiple-disk clutch for locking the mechanism in direct drive, an input shaft connected to the turbine, and an output shaft which transmits power to the rear axle.

In operation, the driving sun gear and reverse planet pinions always revolve in the same direction. The pinion-shafts, which are housed in the planet carrier, can force the carrier to move in either the forward or the reverse direction, depending upon the application of power. In direct drive, both the input and output shafts turn in the same direction and at the same speed. To operate the automobile in reverse, the reverse band is applied hydraulically to start a cycle which turns the planetary unit in a counter-clockwise direction. When the mechanism is placed in neutral, the clutch and bands are in the "off" position, and since there is no reaction member within the planetary system, the carrier does not rotate. The gears then spin freely and impart no motion to the pinion-shafts.

The function of the front pump, which is driven by the engine, is to supply the volume and pressure of oil for starting, operating at low speed, and reversing. The rear pump serves two important functions—first, it operates the direct-drive clutch and fills the converter when the car is being pushed or towed to start the engine; second, at speeds above forty-five miles per hour, it takes over the entire job of oil supply, whereas up to that speed both pumps operate simultaneously. At the speed mentioned, the front pump runs without absorbing engine power, since its oil supply is by-passed and recirculated without doing work. The smaller output of the rear pump is adequate, owing to its high speed.

* * *

Cornell University Announces Lectures on Industrial Relations

Cornell University announces that, beginning February 10, a series of five lectures will be given on the general subject "The New Industrial Relations—A Challenge to America." These lectures have been made possible by a grant from Edward L. Bernays, public relations counsel and an alumnus of the university. The first lecture will be "Collective Bargaining and American Institutions," by Professor Louis M. Hacker of Columbia University.

Milling Cams without a Master or Lay-Out

IT has always been a problem to make cams at a low enough cost to permit the economical use of automatic screw machines for short-run jobs. Frequently, cams designed for a certain job are used for other work, with or without modifications. It generally requires more time to select a set of cams to suit the work to be done than to produce a new set designed specifically for the job, and is generally not as satisfactory.

Disk cams for use on Brown & Sharpe Nos. 00, 0, and 2 automatic screw machines can be quickly and economically cut from special cast iron or mild steel blanks by means of the milling machine attachment here described. This attachment, developed by A. G. Jacobson, Chicago, Ill., eliminates the need for a master cam or lay-out of the cam shape on the surface of the blank to be cut. It has the further advantage that surplus stock need not be punched or nibbled from the cam blank.

The attachment is applicable to any milling machine having a table elevating screw and a spindle that will accommodate a 9/16-inch diameter end-mill. End-mills of 9/16 inch diameter are generally employed, since this dimension is the average of the different diameters of the cam follower rolls used on automatic screw machines. A cutter 1/2 or 5/8 inch in diameter can be substituted if it is necessary to have the cutter equal the roll diameter. In cutting steel blanks, a lubricant is required. A special grade of cast iron, however, will machine easily without a cutting fluid.

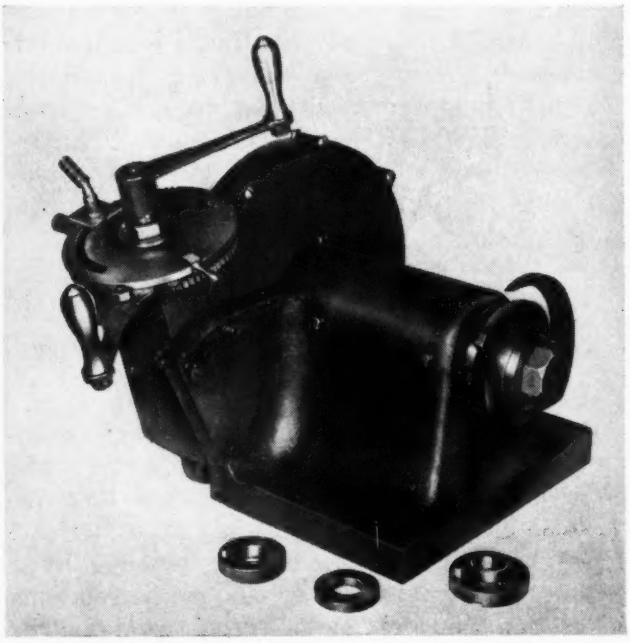


Fig. 1. Special Dividing Head for Milling Cams without the Use of a Master or a Lay-out on the Cam Blank

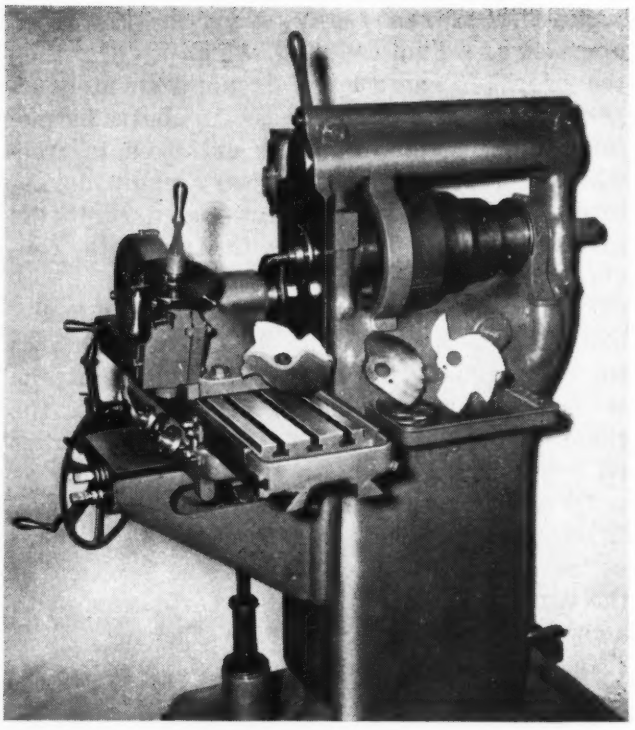


Fig. 2. Cam Cutting Attachment Mounted on a Milling Machine. Several Completed Cams are Shown on the Machine

The attachment consists essentially of a special dividing head, Fig. 1, which is mounted on the table of a milling machine and employed for rotating the cam blank. The blank to be cut is clamped to the right-hand end of a worm-gear driven shaft. The interchangeable disks shown lying in front of the dividing head are used to hold the three sizes of cam blanks, which have various sized bores and dowel-pin holes. A ratchet wheel and handwheel are connected to the knee screw for fine adjustments in elevating the cam blank.

The ratio between the worm and worm-wheel of the dividing head is 80 to 1. The ratchet wheel shown mounted on top of the head at the left is provided with eighty teeth. It is therefore possible to obtain 6400 divisions in a complete cam blank, or 64 equal divisions in each one-hundredth part of the cam circumference. The worm-wheel is 10 inches in diameter—larger than that of any cam used on a Brown & Sharpe automatic screw machine. A handle on top of the dividing-head ratchet wheel is used to rotate the work while cutting concentric portions of the cam periphery. Another handle, mounted on the side of the ratchet wheel, is moved back and

forth manually to rotate the work a preset amount when cutting the throw portions of the cam circumference.

The ratchet wheel shown at the lower left in Fig. 2, which is used to operate the elevating screw on the knee of the milling machine, is 13 inches in diameter and has 200 teeth. Since most milling machines require ten turns of the screw to elevate the table 1 inch, there is a rise of 0.0005 inch per tooth of the ratchet wheel.

A set-up chart has been prepared for use with the cam milling attachment that shows the settings to be made on both rotating and elevating ratchet wheels for various rises per one-hundredth of the cam circumference. The chart gives settings from a fine rise of 0.001 to a coarse rise of 0.480 inch per one-hundredth of the cam circumference. It is only necessary to divide the desired throw (in inches) by the number of hundredths of cam circumference in which the rise is to take place. The figure shown on the chart that is nearest to this "rise per one-hundredth" is used for the ratchet settings.

The ratchet gearing in the dividing head is then set so that each movement of the ratchet handle will rotate the cam blank a certain amount, after which the elevating ratchet mechanism on the knee is set to raise the cam blank a certain distance per increment of rotation.

It is necessary to locate the cam cutting attachment so that the center of the cam blank is directly below the center of the cutter in the milling machine spindle. When so located, the table of the machine should not be moved either longitudinally or transversely. Generally, the ratchet-wheel handle for rotating the blank is operated with the right hand while the elevating ratchet wheel is revolved with the left hand. However, elevating and rotating parts of the attachment can be connected and operated by power if the expense is warranted.

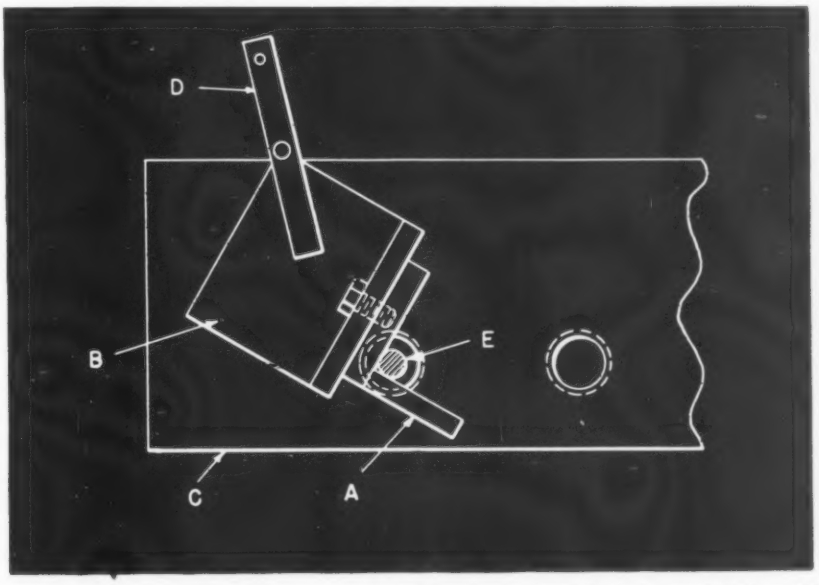
* * *

Welding Jig for Salvaging Drilled Parts

By DONALD A. BAKER

The inexpensive welding jig shown in the accompanying illustration is used in conjunction with an electric welding machine to salvage parts in which there are incorrectly located holes. The most successful method of repairing such holes is by electric welding, but it is difficult to strike the arc at the bottom of the hole and withdraw the electrode without its touching the sides. This procedure is almost impossible to do by hand, and yet for a satisfactory repair job, the metal must fill the hole from bottom to top.

The function of the fixture is to act as a guide for the welding rod. The V-trough *A* is made of wood, and is attached to an angle-plate *B;* this plate is clamped to the work *C* with a parallel saddle clamp *D*. When the trough is located over the hole to be filled, it guides the electrode *E* squarely into the bottom of the hole. After the arc has been struck, the rod is slowly withdrawn, care being taken to see that the puddle of molten metal which forms at the bottom flows clear to the sides and completely fills the hole. Care also should be taken not to withdraw the rod too fast. The metal should be built up at the top of the hole more than appears necessary, as otherwise shrinkage of the molten metal will cause a cavity.



Jig Used in Conjunction with Electric Welding Machine to Salvage Dies or Other Parts in which Holes have been Incorrectly Located

Questions and Answers

A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

Punching Narrow Slots in Heavy Plate

X. T.—We have had difficulty with a job involving the punching of rectangular slots in annealed mild-steel plates 5/8 inch thick. The slots are 1/2 inch wide by 3 inches long, and are staggered with about 3/8 inch of metal between them vertically and 3/4 inch horizontally. Punching of each slot must be done in a single operation in a 100-ton press.

We have made the punches in our own shop from high-carbon chromium tool steel by ordinary machining methods, after which the punches are heat-treated by heating to 1800 degrees F., oil quenching, and then tempering at from 450 to 500 degrees F.

At a rate as slow as six holes per minute, these punches only last, on an average, for about 400 holes. In some cases, they last for only about 100 holes before fracture. As the tools are kept cool during the work by a constant flow of cutting compound, the trouble is not overheating. What suggestions can be made with regard to this work?

Answered by Editor, "Nickel Steel Topics," Published by the International Nickel Co., Inc.

The difficulty is due in part, at least, to the ratio of the width of the slot to the thickness of the plate. It is generally recognized that in punching holes of a diameter or width that is less than the thickness of the material being punched, great stresses are set up in the punch, causing early failure. If the width of the slots could be increased to 5/8 inch or more, an improvement would doubtless be noted.

The following general rules applicable to work of this type may prove of assistance: The punch should be tapered to provide clearance along the shank. Many punches are broken in stripping because of insufficient clearance.

There should be some clearance between the punch and the die. The general rule is to have the punch made to size and have the die impression over-sized by 10 per cent of the thickness of the material being punched. The die hole should also be given some clearance by tapering from the top outward toward the bottom.

Punches are quite often ground with some shear, and in this case, a scalloped shear on the punch might be beneficial. When this is done, it is believed that there should be no shear in the die.

In providing clearance on both punches and dies by tapering, the taper is not extended to the cutting edges; the parallel sides extend whatever distance is deemed necessary to permit redressing. In some cases, this will be as little as 1/16 inch, and in others it will be considerably more on both the punch and the die.

If multiple punches are used (which in this case is not indicated), the punches should be stepped so that the material in the first hole is cleared before the second punch engages the plate. This is to prevent the upset metal produced by the first punch from squeezing the second punch, which often results in breakage.

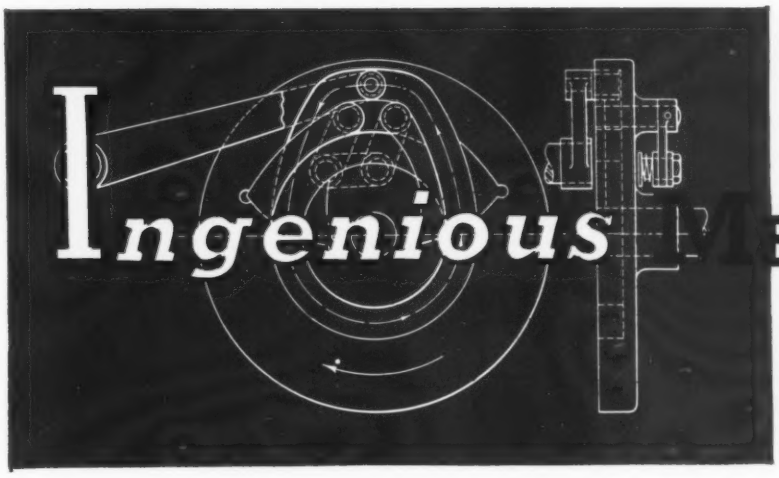
No fault can be found with the tool steel used for the punches. Experience has shown, however, that whenever breakage seems excessive with a high-carbon chromium tool steel, a nickel-chromium steel with approximately 0.75 per cent carbon, oil-hardened and tempered to 55-60 Rockwell C, will have greater toughness and strength.

If the suggestions in the preceding paragraphs are followed and the short life of punches still continues, possibly an oil-hardened die steel, such as is made by several tool steel manufacturers, might be used. These oil-hardened die steels do not have quite the resistance to wear that the steel now used has, but they should be good for over one thousand holes.

* * *

Ten-Thousand Horsepower Motor for Testing Jet Engines

A 10,000-H.P., 3600 R.P.M. synchronous motor—double the largest size ever built for this high speed—will soon be in manufacture at one of the plants of the Westinghouse Electric Corporation. It will drive two Sturtevant blowers, one mounted on each end of a shaft to provide air for testing jet engines. The blowers, each of which is capable of delivering 125,000 cubic feet of air per minute against a pressure of over 7.5 pounds per square inch, are overhung on the shaft, the largest ever to be mounted without the use of an outboard bearing.



Ingenious MECHANISMS

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and other Devices

Comparison of Braking Required for Different Indexing Mechanisms

By MAURICE KNOTT and GEORGE LEVESQUE

The indexing mechanism shown in Fig. 1, which is part of a machine built in 1880, was recently analyzed to determine if it was more complex than necessary for the function performed. The investigation resolved itself into an acceleration problem and a comparison of the braking required for it and similar mechanisms.

To facilitate comparison, the mechanisms to be discussed will be of the linear indexing type. In the Scotch yoke mechanism, shown in Fig. 2, crank *C* rotates at constant speed. This imparts a harmonic motion to yoke *B* and pawl *P*. Member *M* must be braked during the last half of its stroke or it will move ahead of the pawl more than the required amount.

The displacement, velocity, and acceleration curves of the pawl are shown in Fig. 3. It will be noted that the maximum deceleration of the pawl occurs at the end of its forward stroke. The brake applied to member *M* must be of sufficient strength to decelerate it at this rate.

The mechanism shown in Fig. 5, which closely approximates that illustrated in Fig. 1, allows a decrease in the size of brake required to decelerate member *M*. Or if the same brake is used, the rate of indexing can be increased by 50 per cent. Crank *D*, turning at constant speed, imparts a simple harmonic motion to yoke *E*, and to crank *G* through the rack and gear segment. Yoke *F* and pawl *P* are oscillated by crank *G*. When the mechanism is in the position

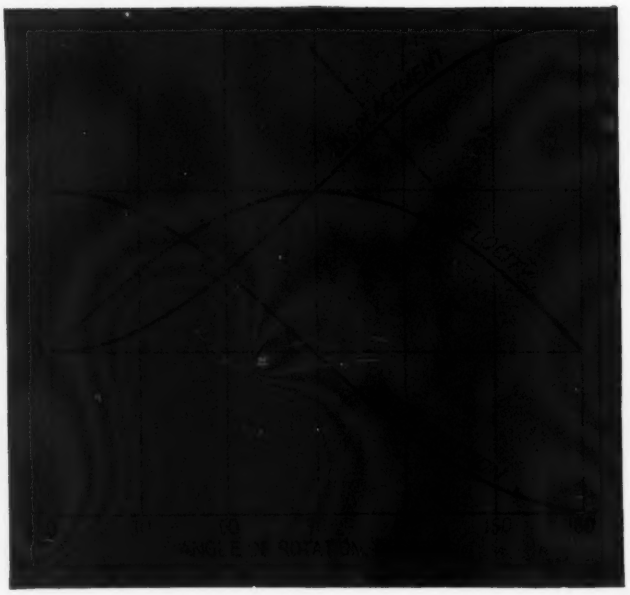


Fig. 3. Displacement, Velocity, and Acceleration Curves of Pawl P Shown in Fig. 2

shown, the pawl is near the end of its forward stroke. At the end of the forward stroke, driving crank *G* has no velocity. Therefore, the acceleration of the pawl at this point is also zero. This is the advantage of the mechanism.

As the pawl approaches the end of its forward stroke, which is the critical point of the cycle in so far as the required braking is concerned, it is decelerating, as shown in Fig. 4. The required braking for the mechanisms seen in Figs. 2 and 5 is proportional to the slopes of the broken lines shown in Figs. 3 and 4, assuming that the braking friction is not affected by the speed. Actually, the rotary speeds of these mechanisms are such that they cause a drag at the brake. This is advantageous in the double-yoke mechanism shown in Fig. 5, because the maximum rate of deceleration occurs at full speed, where the drag is greatest. However, with the mechanism shown in Fig. 2, the speed and drag are zero at the point where maximum braking is required.

Light-Weight Metals Used in Small, High-Speed Engines

A light-weight engine whose low weight-to-horsepower ratio is a result partly of the extensive use of light metals and partly of a unique design embodying fewer parts than other gasoline engines recently was put into production by Sensation Engines, Omaha, Neb. Weighing only 18 pounds, this new Mono-cycle engine is capable of developing 2 to 3 H.P. and can be used to power such equipment as air compressors, generators, power mowers, and other devices requiring a high-speed drive.

Fig. 4. The Braking Required for Member M, Shown in Fig. 5, is Proportional to the Broken Line. Acceleration of This Member at the End of its Stroke is Zero

Fig. 5. Double-yoke Linear Indexing Mechanism which Requires Less Braking for Member M than the Mechanism Shown in Fig. 2

Tool Engineering Ideas

Tools and Fixtures of Unusual Design, and Time- and Labor-Saving Methods that Have been Found Useful by Men Engaged in Tool Design and Shop Work

Magnetic Holding Fixture Speeds Assembly Operation

By HERBERT WEITZ, Union, N. J.

Unless mating parts are located carefully, the assembling of parts on an arbor press often results in high scrap loss. One difficult job involving the assembly of a steel bushing and a brass work-piece was handled successfully on an arbor press by the use of a magnetic holding and locating fixture.

The two parts, shown at *A* in the accompanying illustration, were designed with a minimum of clearance and little chamfer. Before the fixture was used, the bushing was located over the bore of the work-piece and pressure applied with the arbor press; it was not unusual for the bushing to tilt and shear metal away from the hole.

The magnetic fixture was constructed as follows: A plug *B* was turned with a pilot *C* which was slightly smaller in diameter than the inside diameter of the bushing. A magnetic bar *D* was then inserted in a milled slot in the plug and fastened in place with set-screws *E*. The magnet used in this fixture was taken from an old radio headphone; any magnet is satisfactory as long as its pull is sufficient to support the weight of the bushing.

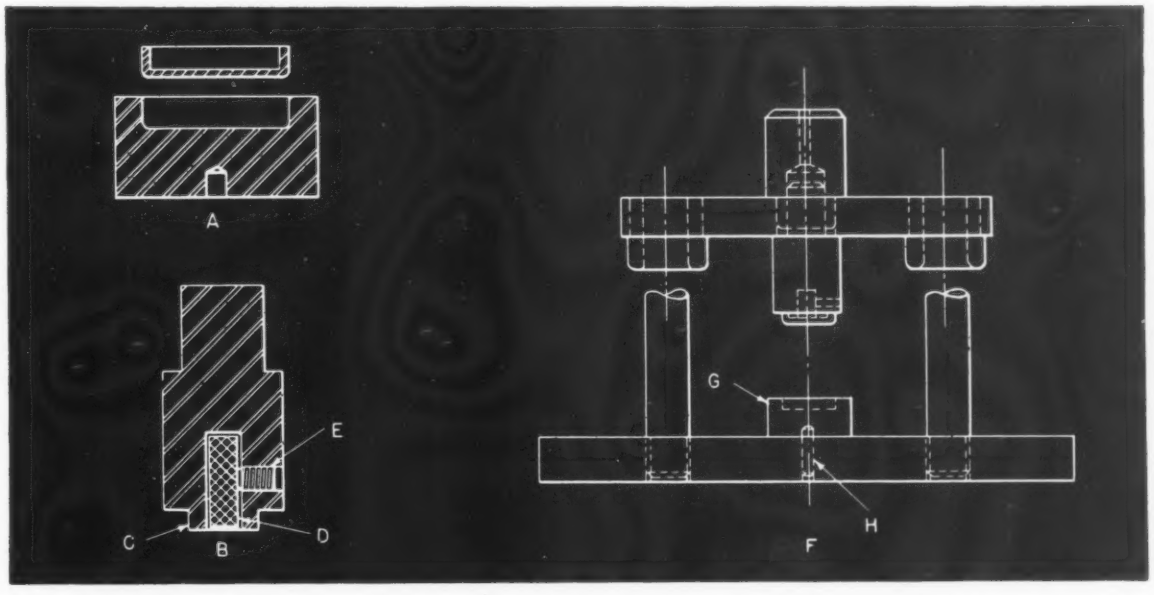
When the plug was attached to the arbor press, as indicated at *F*, the bushing slipped over the pilot diameter *C*, and the work-piece *G* positioned by the locating pin *H*, no trouble was encountered in assembling the parts.

Lathe Attachment for Chamfering Both Ends of Cylindrical Parts

By MARK W. PURSER, Tenafly, N. J.

Both ends of small cylindrical pieces were simultaneously chamfered at a rapid rate in the plant of the Farmingdale Aircraftsmen Mfg. Corporation, Farmingdale, N. Y., by means of the simple lathe set-up shown in Fig. 1. The work, shown at *A*, has an axial hole through it, which is chamfered at both ends.

The work-piece is held by a plier type hand tool between two revolving internal chamfering tools *B* and *E*. One tool is attached to the



A Fixture Incorporating a Bar Magnet is Used for Locating Work while Assembling Mating Parts on an Arbor Press

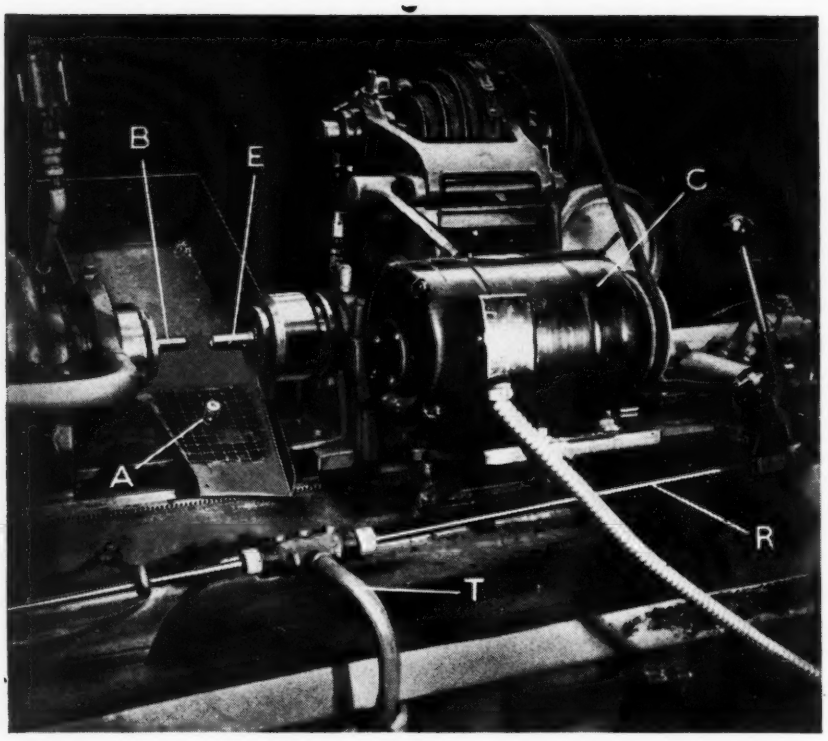


Fig. 1. Lathe Set-up for Simultaneously Chamfering Both Ends of Cylindrical Parts. The Set-up Consists Principally of an Auxiliary Headstock Installed on the Right-hand End of the Lathe

regular headstock spindle of a small engine lathe, while the other is held in the rotating spindle of an auxiliary headstock, installed on the right-hand end of the lathe. The second headstock can slide to the right or the left on the ways of the lathe. Its spindle is driven by an auxiliary electric motor *C*.

With the work-piece held in the chamfering position, the auxiliary headstock is moved hydraulically approximately 1/4 inch to the left, so that both ends of the hole are chamfered simultaneously. When the operation is completed, the right-hand headstock is returned hydraulically to its original position. A double valve controlling this two-way hydraulic movement is operated by rod *R*. In the center of this rod is a T type forked extension *T* which can be moved to the right or left by the knee of the operator. The arrangement of the knee control is shown diagrammatically in Fig. 2.

In handling a job of this kind with the set-up described, if hydraulic equipment is not available, the right-hand headstock can be connected directly to rod *R*. Another alternative is to operate the right-hand headstock by means of flexible cables *D*, Fig. 3, passing over pulleys *P* to foot-pedals *F*.

If the work-piece to be chamfered is too large to hold with hand tools, it can easily be accommodated in a hand- or air-operated vise installed on the spindle center line. The vise could be mounted on a light, standard lathe cross-slide, with the carriage feed disengaged so that it is free to float to the right or left.

External chamfering of the ends of small cylindrical pieces can be accomplished in a similar

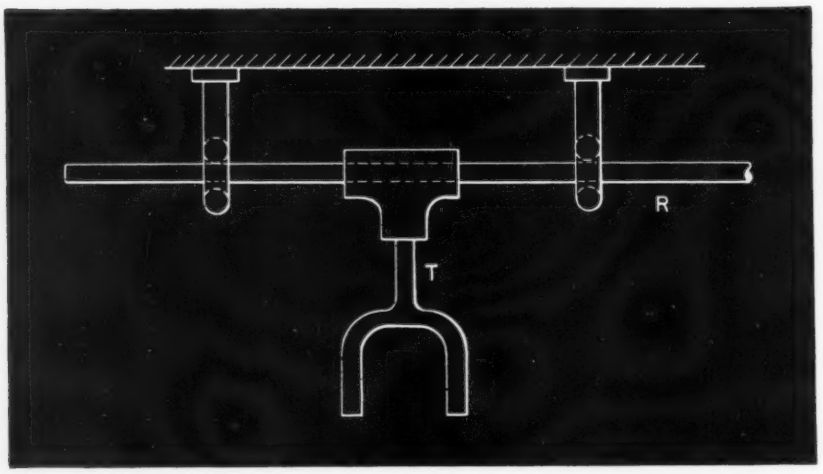


Fig. 2. Hydraulic Movement of the Auxiliary Headstock Shown Mounted on a Lathe in Fig. 1 is Controlled by Rod R and Forked Extension T, which is Actuated by the Operator's Knee

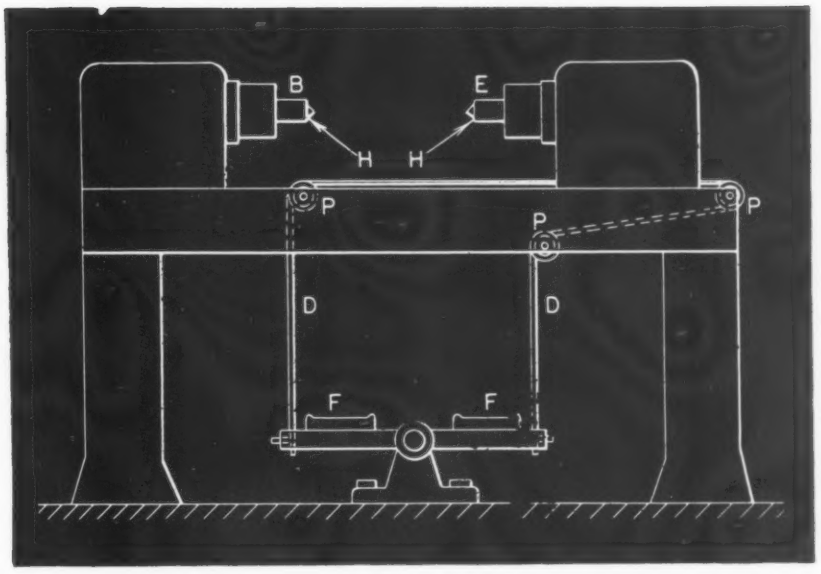


Fig. 3. The Auxiliary Headstock of the Lathe Can be Moved without the Use of Hydraulic Power by Means of This Foot-operated Set-up

manner by the use of external chamfering tools like those shown in Fig. 4. Screws *S* serve to lock cutter *M* in place. The depth of the chamfer is automatically controlled by the end surface of stock-stop *H*.

Indexing Fixture for Use in Machining Aluminum Containers

By DONALD A. BAKER, Boonton, N. J.

The smoke container head shown at *X* in the illustration on page 186 has a row of staggered holes drilled around the circumference for attaching the head to a special wooden base. These holes were drilled and countersunk—two at a time—with tools similar to regular center drills mounted in the machine shown at *Y*.

This machine consists of a baseplate *A* on which are mounted two drill spindles *B*. The spindles are located at an angle to each other and in different planes, so that one drills the lower holes, and the other the upper holes. Both spindles are supported by self-oiling wooden bearings mounted in cast-iron blocks *C*, and are driven by two 1/2-H.P. motors which are bolted to adjustable hinged supports beneath the baseplate.

A T-head *D* feeds the spindles. It is actuated by a rack and pinion on shafts *E* and *F*, respectively, through handwheel *G*. To reduce friction between the spindles and the T-head, a free-running pin *H* is inserted in the end of the spindles; it fits in a hardened steel bearing and contacts a steel ball at the end of the bore. This bearing and ball take the thrust.

On completion of the drilling operation, the spindles are withdrawn by springs *J*, which are located between the front bearing and a thrust ball bearing *K* next to pulley *L*. To index the work, lever *M* is moved from left to right. This causes the arm *N* to engage one of the pins *O* on indexing plate *P*. Lever *M* comes in contact with the adjustable stop *Q* at the same time that indexing pin *R* strikes against the back of arm *N*. Thus, the index-plate is held rigidly while the drills are brought into use. A pin *S* under

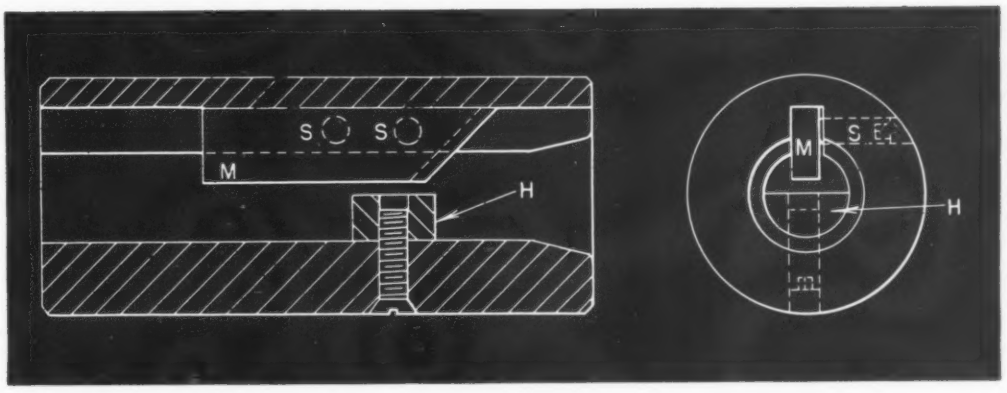
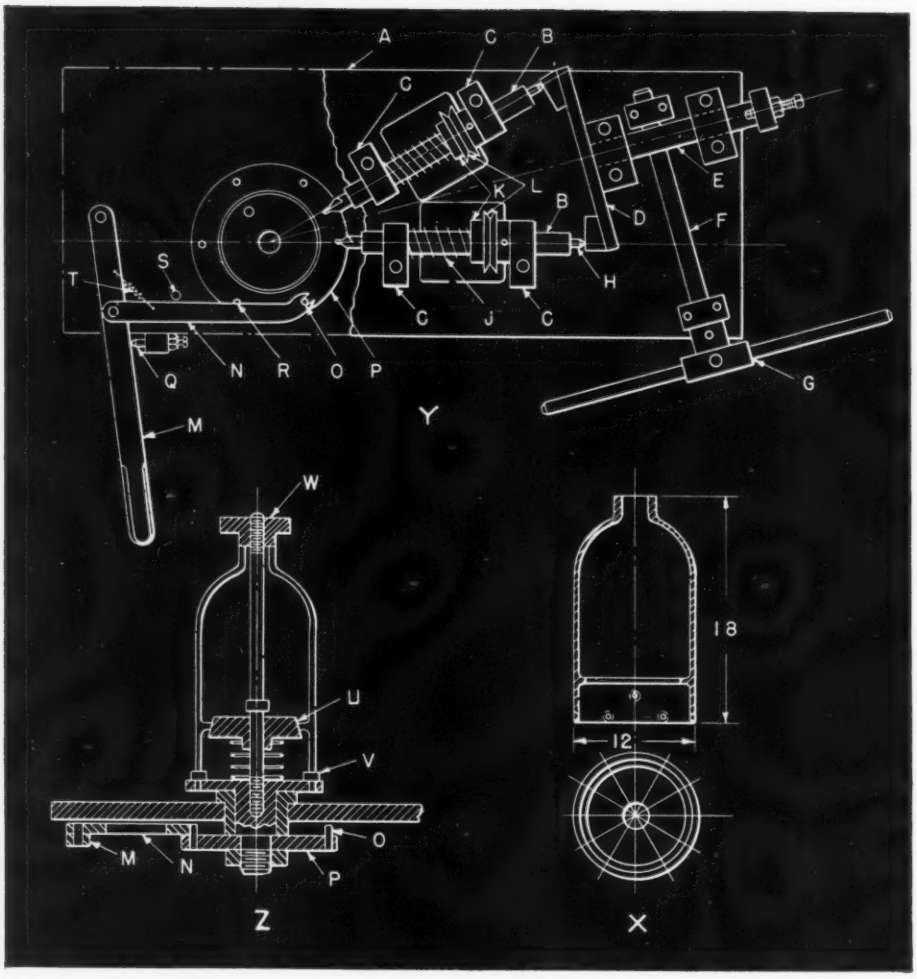


Fig. 4. An External Type of Chamfering Tool Showing Cutter M and Stock-stop H



(X) An Aluminum Container that is Drilled and Countersunk as Indicated. (Y) This Special Fixture Locates the Work for Drilling and Permits Machining Operations to be Carried out Simultaneously on Two Holes in Different Planes. (Z) The Container is Located on the Indexing Fixture by the Tapered Surface U and a Central Stud

the baseplate acts as a stop when arm *N* is returned by spring *T*, thus locating the arm in the correct position to engage the next indexing pin.

When the fixture is in operation, the work is placed over a central stud, as shown at *Z*, and centered by means of the taper on the edge of disk *U*, which is held in place by a coil spring. The work is located at the bottom by buttons *V*, and is finally held in place by knurled nut *W*, which is tapped with but two threads to permit quick action. While simple in construction, the entire fixture has proved both fast and accurate.

Variables Affecting Product Similarity in Powder Metallurgy

THE difficulty of obtaining identical results in large-scale manufacture have long hindered advances in the science of powder metallurgy. This difficulty is due principally to present methods and techniques, which introduce numerous variables not yet completely understood or controlled.

In conjunction with the current program of standardization of test methods and techniques in this field, the National Bureau of Standards has undertaken an extensive investigation of the conditions contributing to the lack of uniformity in sieve analysis of metal powders. These investigations reveal that atmospheric humidity has a marked effect on the results obtained, and that controlled atmospheric conditions during sieve testing of metal powders may therefore be necessary.

A contributing factor, in addition to humidity, is a cumulative sampling error that results from repeated riffle cutting of limited powder supplies. Also, significant differences in sieve analysis were often obtained when samples of the powder were sieved at different times, and different sets of certified sieves used for the same powder gave considerable variations.

Further studies aimed at eliminating, controlling, or evaluating the effects of these and other variables with a view to improving product similarity are under way.

Working with the Men in Customers' Plants

By BERNARD LESTER
Assistant Industrial Sales Manager
Westinghouse Electric Corporation

WE are in an industrial period marked by a tremendous pressure toward reduced manufacturing costs. To achieve that objective, manufacturers must have better machines and tools, and such equipment must be carefully engineered to the job.

Business for the machine tool and other sales engineers originates with factory executives responsible for manufacturing equipment, operations planning, and production. Getting into plants and working with manufacturing men, therefore, presents the greatest opportunity for the sales engineer.

Some purchasing agents insist that the approach to the men in the plant be through them. The purchasing agent must be in close touch with possible future purchases, but it is to his own interest to clear the path of the machine tool and small tool salesman. The salesman may raise numerous technical questions which the purchasing agent cannot possibly answer, in which case the purchasing agent must open the way for the sales engineer to contact the men responsible for manufacturing.

When this opportunity exists, the sales engineer has the greatest chance of all to do creative selling. By knowing machines, tools, materials, and manufacturing processes, a quick sales eye can visualize other methods that would be more efficient. Thus the salesman can create a need for his equipment that was formerly unrecognized. In doing so, he sells himself, sells his engineering ability, and sells his line of equipment.

How can the sales engineer best establish high regard for his ability? Certainly not be merely suggesting that the potential customer buy a new grinding machine, drill press, boring mill, or lathe. He can do his best by first studying the present over-all process and then each individual operation employed in machining a part. He can find out present machining costs and indirect costs.

Knowing such facts as these, the sales engineer is then in a position to develop a better lay-out, incorporating improved machines and tools, for the job. His suggestions and recommendations must, however, be based on calculations subject to a rigid check and proof. They must offer resultant savings in dollars, not hopes. They must be balanced against capital outlay and be justified beyond question. Or, as we commonly express it, the machine installation must pay for itself in a few years—long before the general process or ultimate product becomes outmoded or radically changed.

Such sales skill goes far beyond finding out if the purchaser is in the market for a new machine, quoting on it, and trying to get the order. The value of the equipment depends on how well its application is engineered. The value of the sales engineer, likewise, depends largely upon how well he can engineer the bought equipment. He should sell not merely a machine or tool, but rather his engineering service plus operating results. The order is only the last step, but, of course, the ultimate aim. This is creative selling—quite different from order taking!

In this method of selling, as in all others, there are a few fundamental points of sales technique worth emphasizing. These may be summed up as follows:

1. Work with the shop man in his field of thought and action. Study his interests. Talk his language. Don't talk down to him. Never take an impractical or superior attitude. Too often the sales engineer who tries to cater to the people in the front office, because of their positions with the company, does not "click" with the men in the shop who can help him most.

2. Suggest better methods and better tool arrangements of existing equipment if this can be done without offense. The sales engineer may even recommend different materials for the product. Initial suggestions without reference to the purchase of new equipment may often be the means of accomplishing the first step for a new salesman—that is, selling himself and his engineering knowledge.

3. Give the man in the shop credit for ideas, even though the suggestions come from the sales engineer. Tell the "higher ups" that the ideas were developed by the shop man, and you will quickly gain his friendship.

4. Do not argue—suggest and lead. Remember the salesman who won the argument but lost the order.

5. When the shop people are "sold" on new equipment, and honestly so, aggressively support their recommendations to the men higher up in the customer organization. It may turn the decision toward making the necessary appropriation.

6. When an order is obtained through the purchasing channels, never forsake the people in the plant. The job is never done until the machine or tool sold is working and earning the expected savings. The early period of operation in the history of a new machine is critical. The man who sold it should not only see to it that the machine works, but also that the operator likes it. If the operator's interest is won, he will make an unusual effort to get results.

Furnaces Capable of Developing Temperatures to 4700 Degrees F.

In order to study the effect of high temperatures on heat-resistant materials, engineers at the Research Laboratories of the Westinghouse Electric Corporation have designed a series of furnaces that can produce heats exceeding 3000 degrees F. One typical unit, now in operation, is capable of developing temperatures of 3100 degrees F. (1700 degrees C.), nearly 200 degrees F. hotter than ordinary high-temperature furnaces. This unit has an effective heat zone of about 4 cubic feet, which means that it can take a charge approximately four times larger than is customary. It is a radiant type furnace, using heavy molybdenum rod laid on ledges in the refractory brick instead of heating elements consisting of fine wire coils wound on muffles.

But 3100 degrees is just another step in high-temperature research. It is by no means the end sought. Another research furnace of the same general dimensions and principle is on its way. This furnace is expected to produce heats of 3400 degrees F. (2200 degrees C.). Still another, but much smaller furnace, is expected to provide temperatures of 4700 degrees F. In it a tungsten crucible, large enough to hold a walnut, is heated in an inert gas by a combination of radiant heat and high-frequency induction.

* * *

Spring Meeting of A.S.M.E. at New Orleans

The 1948 spring meeting of the American Society of Mechanical Engineers will be held March 1 to 4 in New Orleans. Eight technical sessions are scheduled, at which twenty-five speakers will present papers on gas turbines, metals engineering, power, materials-handling, heat transfer, fuels, and management. Arrangements have been made for members to visit a new steam-electric generating station and a sugar refinery.

* * *

Westinghouse engineers report that one of the most interesting new trends in dielectric heating is the use of micro-waves. The early laboratory work with the use of waves of such extremely high frequencies for heat-treating thin sheets, curing thin synthetic films, or curing insulation on wire as a continuous process has been most promising. The techniques for this work are borrowed directly from radar.

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

Sidney Heavy-Duty Engine Lathe

A 32-inch heavy-duty engine lathe with a sixteen-speed dial-controlled geared headstock equipped throughout with herringbone gears has recently been brought out by the Sidney Machine Tool Co., Sidney, Ohio. The spindle and intermediate shafts of this new lathe are supported by center bearings, in addition to the conventional end bearings.

The gear-box provides forty-eight changes for cutting threads from 3/4 to 46 per inch and forty-eight changes of feeds from 0.003 to 0.207 inch per revolution of the spindle. The closed design of the gear-box unit serves to prevent dirt and chips from entering.

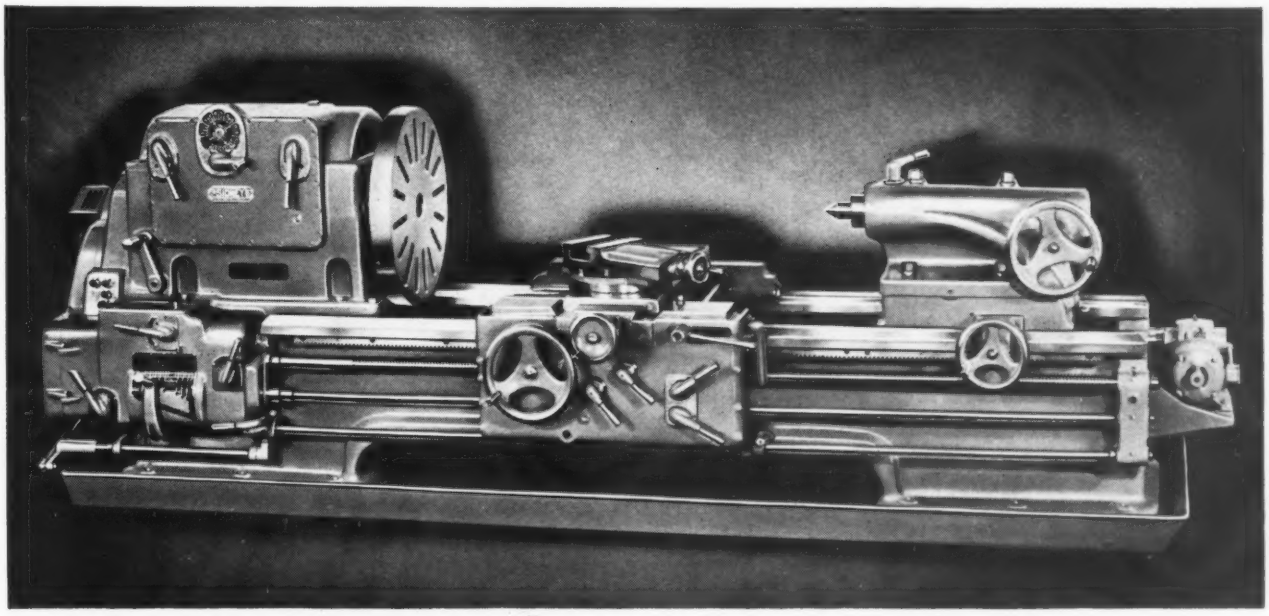
The lathe bed is of exceptionally rugged design, having a double-wall longitudinal center girt, in addition to double cross girts. Double-wall construction is also employed for the apron, which has all shafts rotating on anti-friction bearings. A built-in rotary oil pump, with filter, provides automatic lubrication to all moving parts and also lubricates the bed ways and cross-slide. For the operator's convenience, the tailstock handwheel is mounted on the side, and a gear reduction unit is provided for positioning the tailstock along the bed. 61

"Toolweld" Electrode for Hard-Surfacing Tools

The Lincoln Electric Co., Cleveland 1, Ohio, has announced two new electrodes for hard-surfacing tools and dies which are designed to simplify procedure and reduce the cost of depositing weld metal of tool-steel quality. One of these electrodes—"Toolweld A"—is intended for air quenching, and the other—"Toolweld O"—for oil quenching. The electrodes are used in building up the working surfaces or edges of cold-working metal cutting and forming tools, and produce surfaces of high strength that resist wear and impact in all applications where high temperatures are not encountered. When deposited on either ordinary carbon steel or any one of the alloy steels, a surface is produced having properties that are said to equal those of the best tool and die steels.

The deposited weld metal is of the 5 per cent chromium type, and can either be used as welded or subjected to a wide range of heat-treatments. When employed on ordinary steel, the weldment can be heat-treated to obtain maximum hardness of the weld. When used on tool steel, the weldment can be heat-treated to suit the nature of the base material.

These electrodes will operate on either alternating or direct current, with the electrode negative when using direct current. They will deposit a thick bead in one pass in the low-current portion of the operating range, and a thin bead in the high-current portion of the range. The thin beads are smooth and flat, requiring a minimum of grinding. The 3/32-inch electrodes have an operating range of 40 to 85 amperes; the 1/8-inch size a range of 65 to 130 amperes; and the 5/32-inch size a range of 95 to 180 amperes.....62



Heavy-duty Lathe Brought out by the Sidney Machine Tool Co.

To obtain additional information on equipment described on this page, see lower part of page 212.

Gorton Super-Speed Swivel-Head Milling Machine

A new 0-16A small size ram type vertical milling machine with hand feed, which is available with either a swivel or a universal head, has been brought out by the George Gorton Machine Co., 1301 Racine St., Racine, Wis., to replace the 8-D fixed-head vertical machine previously manufactured. This improved machine is designed to insure a high degree of accuracy and sensitivity. It has been so proportioned as to permit the operator to sit at the machine in a normal, comfortable position.

The heavy column, adjustable ram, sensitive table and saddle movements, and adjustable swivel or universal head with "Super-Speed" spindle are features that make this machine especially suitable for use in tool-rooms and die and mold shops, as well as for production milling operations on small parts.

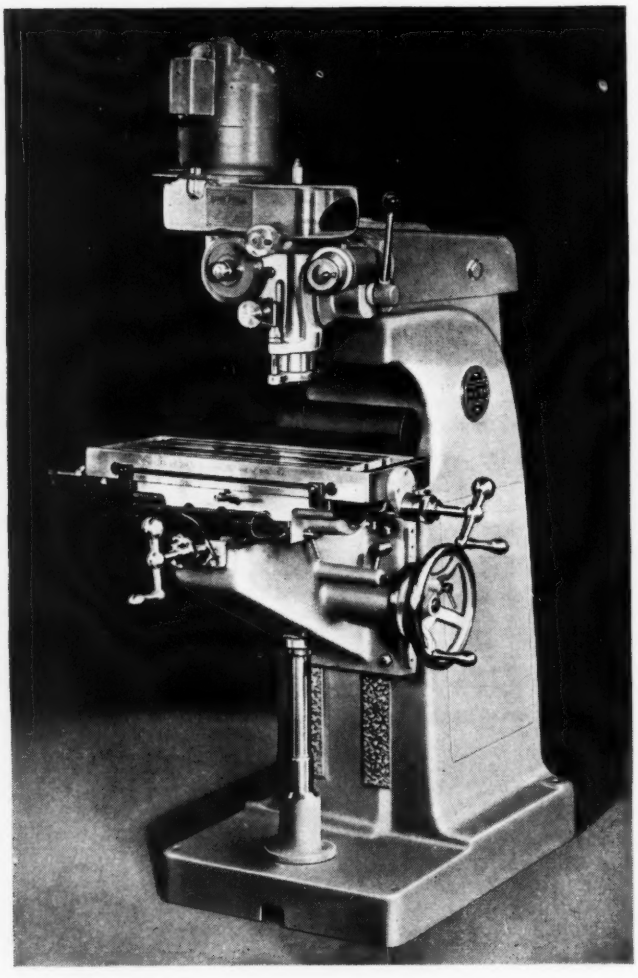
Special features include positive brake for instant stopping of spindle and for locking it in place when changing cutters or making set-ups; stop graduated to 0.001 inch for accurate setting of cutter depth; and quick-acting belt tension adjustment. The adjustable ram can be furnished with either a single swivel head graduated for a movement of 45 degrees to the left and 90 degrees to the right, which will swivel through an angle of 360 degrees parallel to the table, or with a universal head providing the same adjustments, but with provision for making an additional 45-degree front and back movement at right angles to the table. The standard spindle takes the Gorton taper collet and accommodates cutters having shanks up to 1/2 inch in diameter.

A 1/2-H.P. high-torque, reversible motor provides six spindle speeds ranging from 300 to 5000 R.P.M. Provisions can be made, however, for a speed range of from 600 to 10,000 R.P.M. This machine can also be equipped with a special extension spindle for general engraving, brass routing, or for light milling operations where maximum cutter visibility is important. 63

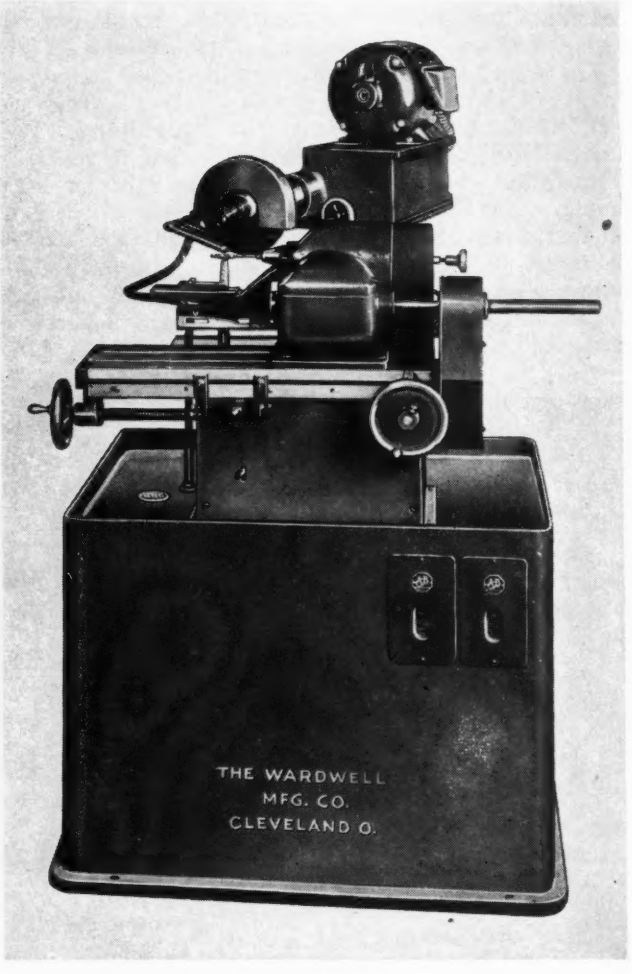
Wardwell Universal Flute Grinder

The Wardwell Mfg. Co., 3167 Fulton Road, Cleveland 9, Ohio, has developed an automatic universal flute grinder capable of handling a wide range of straight or spiral grinding, from the solid, on tools such as small carbide drills, taper pin reamers, and similar work. It has a capacity for grinding work ranging from 1/16 inch to 10 inches in diameter. The maximum table travel is 9 inches.

The machine is equipped with



Improved "Super-Speed" Milling Machine Built by George Gorton Machine Co.



Automatic Universal Flute Grinder Made by the Wardwell Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 212.

an automatic indexing head which is provided with an automatic locking device for the indexing slide. Spiral fluting can be accomplished through a train of gears at the end of the work-spindle, which are connected to the lead-screw in the table slide. Spiral leads as short as 5/16 inch to one turn can be obtained. This machine can also be arranged for automatic milling. 64

Hardinge Precision Lathe with Variable-Speed Drive

Hardinge Brothers, Inc., Elmira, N. Y., have added to their line of precision lathes a new high-speed model equipped with variable-speed drive and free-spindle clutch. This lathe is designed to machine work to extremely close tolerances and finished specifications in toolrooms and laboratories.

Hardened and precision-ground steel bed ways of improved design are an important feature of the new lathe. These dovetail ways form a solid bed top and are so designed that they are protected from falling chips. The lathe bed has a three-point mounting which insures maintenance of the original bed accuracy even when the machine is placed on an uneven floor.

The fully enclosed headstock has a preloaded ball-bearing spindle ground to take 1-inch capacity 5C Hardinge collets and 6-inch capacity step chucks. The Hardinge standard threaded spindle nose takes step chuck closers, jaw chucks, and faceplates. The headstock spindle is driven by center-drive belts placed between the spindle bearings. These belts can be easily replaced without removing any part of the machine.

The new compound-slide rest is anchored to the dovetail ways by a patented positive lock which permits rapid positioning on the ways. The index-slide has a hardened and ground steel section for resisting wear, and can be swiveled 360 degrees. The feed-screws are hardened and mounted on preloaded ball bearings to insure long life and sensitive operation. The feed-screw dials are graduated for direct reading to 0.001 inch.

The ball-thrust tailstock spindle has a full bearing in the tailstock body regardless of its position, and the body of the tailstock has a dovetail section which permits it to be securely anchored to the dovetail ways. A welded steel base encloses the driving unit and tool storage compartment.

The stepless variable-speed drive permits any desired speed from 90 to 3500 R.P.M. to be obtained by turning a large handwheel. The variable-speed drive is so arranged that when the electric motor is shut off, the handwheel is locked and cannot be turned. The free-spindle clutch can be disengaged to facilitate balancing and inspection of high-precision work.....65

Wick Tap Grinding Fixture

A fixture for grinding flute relief at the cutting end of taps ranging from No. 8 to 5/8 inch in size is a recent development of the Wick Co., 114 Elm St., Meriden, Conn. It accommodates right- or left-hand taps with from two to six flutes, and can be used on any cutter grinder or lathe equipped with a toolpost grinder.

The fixture head is mounted on a prelubricated ball bearing having a taper shank. A swivel plate on the face of the head carries the tap-supporting center. The swivel plate is moved to the right of the center position for right-hand taps and to the left of center for left-hand taps. An adjustable indexing arm is attached to the head by a threaded hole marked to correspond with the number of flutes on the tap. A locating pin on this arm engages the tap between flutes for positioning taps with more than two flutes. A straddle type locating pin is employed for taps with two flutes.

The grinding operation is accomplished by advancing the work to the wheel and rocking the head of the holder, using the free end of the locating pin to impart the rocking motion. 66

Hardinge High-speed Precision Lathe Equipped with Variable-speed Drive and Free-spindle Clutch

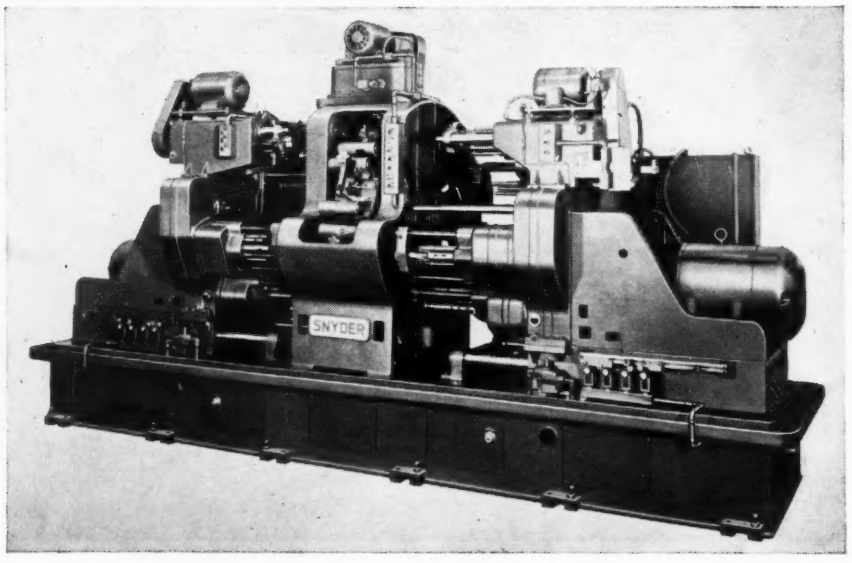
To obtain additional information on equipment described on this page, see lower part of page 212.

Snyder Automatic Machine Designed to Perform Six Operations on Cast-Iron Blocks

Among the special-purpose machines recently built by the Snyder Tool & Engineering Co., Detroit, Mich., is a two-way, hydraulic-feed automatic which drills, reams, countersinks, spot-faces, bores, and taps holes in both ends of hydraulic lift cylinder blocks. The machine has eight work stations with eight trunnion-mounted fixtures, in which the work is manually clamped. An electrically operated automatic Geneva mechanism indexes the work through successive operating positions.

Power is transmitted to individual auxiliary heads at each station by two master driving heads. The auxiliary heads carry individual bushing plates located on a fixture designed to maintain the required accuracy. The master driving heads are also equipped with rapid-advance tapping heads having individual lead-screw tapping spindles that feed the tap into and out of the work, thus assuring accurate threads. The right-hand side of the machine has a thirty-seven spindle multiple head and a two-spindle tapping head. The left-hand side has a twenty-three spindle multiple head and a six-spindle tapping head.

Since the individual heads are mounted on the master heads, the machine can be quickly adapted for handling redesigned parts by simply changing the individual heads. Being fully automatic, it does not require a skilled operator. Both high-speed steel and carbide tools are used. The drills are operated at a speed of 80 feet per minute, and the reamers at 45 feet per minute. Feeds are variable, and are adjusted by a hydraulic meter valve. Production is forty pieces an hour. 67



Snyder Automatic Machine for Processing Cast-iron Blocks

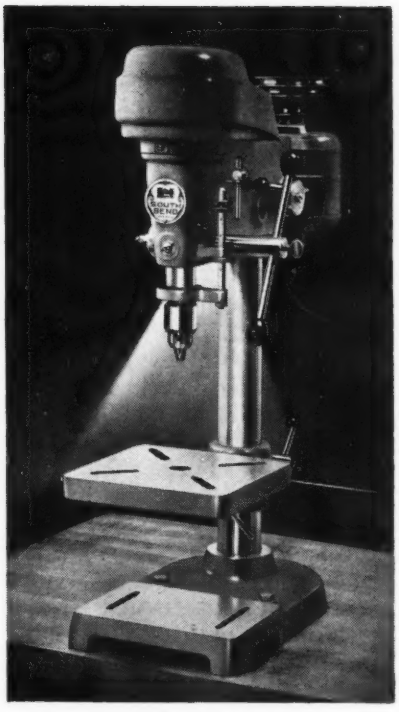
Cook Carboloy-Tipped Tools

The R. F. Cook Mfg. Co., 2732 Second St., Cuyahoga Falls 10, Ohio, has announced a new line of carbide-tipped circular cutting tools of standardized shapes which will be kept in stock for quick delivery. These tools have four individual cutting points, which can be successively indexed or brought into the cutting position, thus greatly prolonging the time between resharpening operations. The tools can be supplied in various sizes and shapes. 68

South Bend Precision Drill Press

A new precision drill press, built in both bench and floor models, has been brought out by the South Bend Lathe Works, 383 E. Madison St., South Bend 22, Ind. Both models will drill 1/2-inch holes in iron or steel at the center of a 14-inch circle.

The drill press spindle has a maximum travel of 4 inches, with spindle speeds of 707, 1305, 2345, and 4322 R.P.M. The free-floating spindle is especially designed to prevent misalignment, side thrust, and whip. The depth gage is graduated in sixteenths of an inch, and has adjustable collars for controlling both the depth of feed and the length of the return stroke.



Bench Model Drill Press Built by South Bend Lathe Works

A built-in light provides shielded illumination for the work area. The quick-acting belt-tension release lever simplifies the changing of spindle speeds and allows the vertically mounted motor to return to its original position after each speed change, thus maintaining the same belt tension for each of the four cone pulley steps. The tilting type table, with a 10- by 10-inch precision-ground surface, has slots for clamping fixtures or work, and the base is also provided with slots. An improved type of double plug binder is provided for locking the table quickly in any position.

The principal specifications of the bench model drill press are: Maximum distance from chuck to table, 10 7/8 inches; table travel, 10 7/8 inches; maximum distance from chuck to base, 17 inches; size of base, 10 3/4 by 17 3/4 inches; height, 35 1/2 inches; and weight, 195 pounds.

To obtain additional information on equipment described on this page, see lower part of page 212.

Specifications for the floor model drill press are: Maximum distance from chuck to table, 40 1/8 inches; table travel, 40 1/8 inches; maximum distance from chuck to base, 46 1/2 inches; size of base, 15 by 21 inches; and height, 65 1/2 inches.

These drill presses are supplied with or without a motor. A 1/3-H.P. 1725-R.P.M. vertically mounted type motor is recommended...69

Pines Pipe and Tube Profiling Machine

Automatic profiling machines for turning, boring, chamfering, burring, threading, tapping, and other machining operations on the ends of pipes, tubes. and bars are a new development of the Pines Engineering Co., Inc., 653 Walnut St., Aurora, Ill. These profilers are built for either manual or fully automatic operation. The automatic types are equipped with hydraulic controls by means of which the machining sequence can be repeated continuously. With the work hydraulically chucked, one or both ends are machined by the action of the rotating heads that hold the cutters. Either one or two heads can be employed.

The fully automatic machines can be set up to handle various lengths and diameters of work ranging from pieces less than 1 inch long to tubes up to 60 feet long. Chute or magazine feed units are used for work lengths up to 24 inches, and reel-fed machines are used for work over 24 inches. When a range of work both over and under 24 inches long must be handled, a single-spindle machine is recommended.

If desired, these profilers can be equipped with conveyors that carry the work to the machine and transport the finished pieces to a convenient point of storage or to areas where further processing is performed. 70

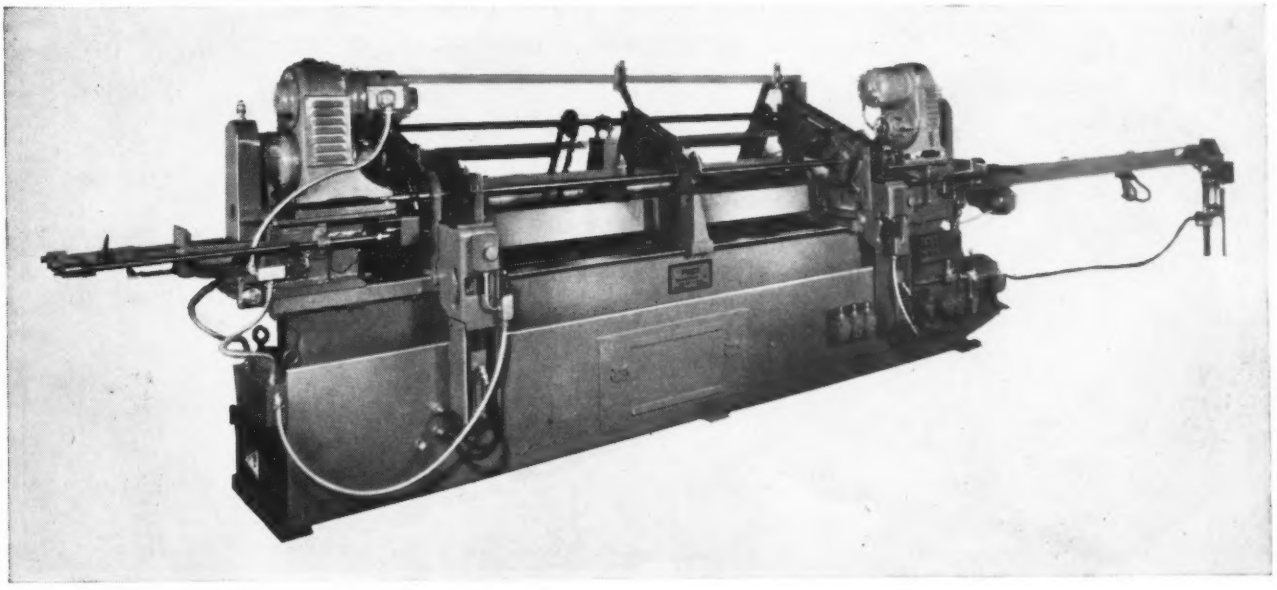
Hammond Chip-Breaker Grinder

Hammond Machinery Builders, Inc., Department GP-14, 1600 Douglas Ave., Kalamazoo 54, Mich., has brought out a Model C-4 chip-breaker grinder designed to meet the requirements of plants that do not have enough chip-breaker grinding work to justify the use of the heavier Model CB-77 machine.

This new smaller-size precision-built machine is especially designed for grinding chip-breaker grooves on carbide tools. The "Any Angle" vise for holding the work has four swivels, each of which is equipped with a dial, graduated in degrees to facilitate setting the tool at the desired angle. The grinder will handle all types of box- and single-point tools up to the 2-inch size. The reciprocating table movements are obtained by means of a conveniently located hand-operated lever.

Hammond Chip-breaker Grinder

The spindle runs on precision bearings, and the wheel has vertical and cross traverse movements. The operating dials are graduated to 0.001 inch. All moving parts are protected against grit and sludge. The resinoid-bonded diamond chip-breaker wheel is 4 inches in diameter and has a face width ranging from 1/8 to 1/2 inch. The speed with 60-cycle,



One of a New Line of Pines Pipe and Tube Profiling Machines

To obtain additional information on equipment described on this page, see lower part of page 212.

direct-current motors is 3500 R.P.M., and with 50-cycle, alternating-current motors 2900 R.P.M. The table has a travel of 6 1/2 inches. The floor model weighs 360 pounds, has a base 17 by 18 inches, and requires a floor space of 22 by 24 inches. The bench model weighs 300 pounds and requires a space of 22 by 24 inches.....71

Westinghouse High-Frequency Generator

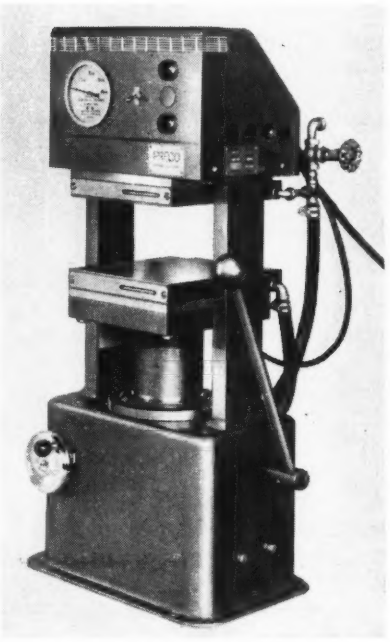
The Industrial Electronics Division of the Westinghouse Electric Corporation, Baltimore 3, Md., has announced a 50-kilowatt, 450-kilocycle radio-frequency generator and a matching two-position work-table with built-in sink designed for high-production induction heating jobs, such as hardening gears and automotive parts or progressive and selective shaft hardening. An aluminum cabinet is used to reduce weight and provide complete radio-frequency shielding. Other features include stepless power output, controlled by the grid control rectifier; filtered air; circuits fully protected from overloads; and 6-inch meters that provide easy-to-read operating information.

The work-table, designed to fit against the front of the generator, has a stainless-steel sink and is arranged for two-station operation. Multiple mounting bosses are provided on the sink for installation of work-handling equipment. The table has dual fittings for quenching and cooling water and two sets of heavy-duty radio-frequency output terminals. The generator is 144 by 60 by 84 inches in size, operates on 230 to 460-volt three-phase 60-cycle current, and weighs approximately 7000 pounds. 72

Preco Bench Type Hydraulic Press

Preco, Inc., 1102 Architects Bldg., Los Angeles 13, Calif., is introducing a new bench type hydraulic press standing 32 inches high. This press is designed for the rapid handling of any job that requires pressures up to 20 tons and that may also require the application of heat. The built-in two-stage hydraulic pump has a high-speed stroke for quick platen closure, which changes semi-automatically to a high-pressure stroke for producing a maximum working force of 40,000 pounds.

The press can be readily adapted for handling a wide variety of work. It can be used individually or in batteries, with built-in hand pump or connected to a central hydraulic system. Electrically heated, water-cooled platens are standard equipment, but the press can be supplied with platens for heating from a central steam plant or it can be furnished with solid platens for cold work. A third platen installed between the two standard platens provides even greater flexibility and serves to double the production capacity of the press.



Bench Type Hydraulic Press Brought out by Preco, Inc.

Platens 8 by 8 inches or 8 3/4 by 12 inches are available. They can be opened from 0 to 8 inches, and are designed to maintain alignment at an even pressure over their entire surface without adjustment.....73

Electrically Heated Chemical Cleaning Unit

A portable, electrically heated chemical cleaning unit for cleaning industrial machinery, conveyor systems, engines, and other equipment is being manufactured

Westinghouse High-frequency Generator

Hartman Electrically Heated Chemical Cleaning Unit

To obtain additional information on equipment described on this page, see lower part of page 212.

by the Hartman Corporation of America, 5147 Natural Bridge Ave., St. Louis 15, Mo.

A constant-pressure, anti-splash spray nozzle regulates the spray pattern for high-temperature cleaning and creates a pulsating stream of superheated water and chemical solution for cleaning and flushing. All injurious fumes, vapors, and chemical-laden steam are eliminated, thus protecting nearby surfaces and preventing clouds of steam from escaping that might endanger the operator.

The new cleaner is built into a waist-high cabinet mounted on 10-inch wheels having rubber tires. A garden hose for bringing water to the machine and a 220-volt electrical connection to supply operating power are the only connections necessary.

Two cleaning compounds that require no water softeners—"Hi-Power Flakes" for removing heavy accumulations of grease and dirt, and a "Lo-Power" granular cleaning compound for lighter work—have been developed for use in this unit. Neither compound contains any free caustic soda in the solution. 74

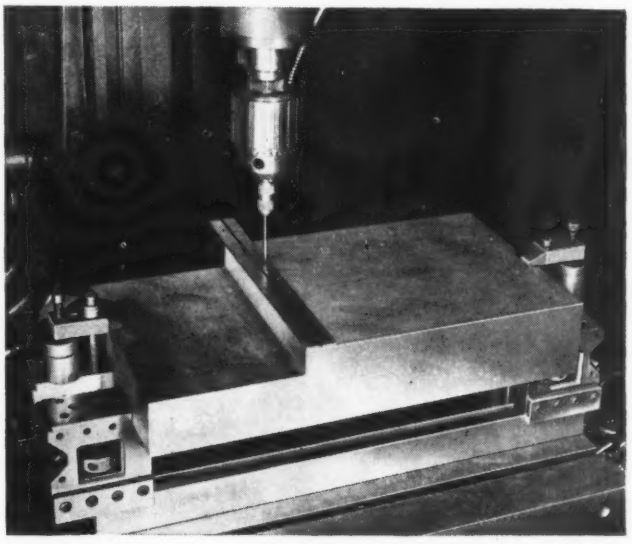
Hanson Work-Holding Fixture

A work-holding fixture consisting of a base, two sliding mounting blocks, clamps, screws, and accessories is a new product of Hanson & Co., 6527 Russell St., Detroit 11, Mich. Although designed to be used on jig borers or jig grinders for tool-room applications, the fixture is also adapted for use on vertical mills, drill presses, slotters, and profiling, engraving, and etching machines. It can also be employed for inspection purposes and for limited applications in production and experimental work.

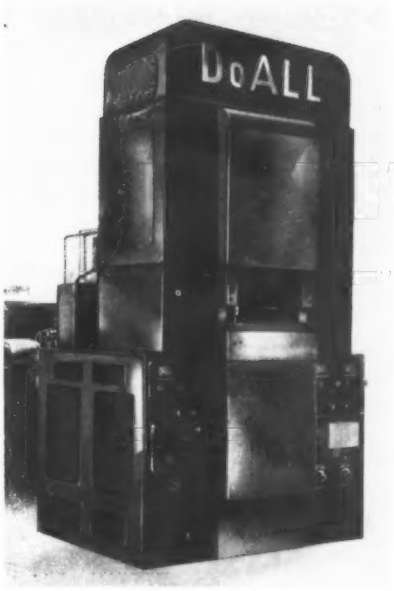
When used for production or experimental work requiring operations such as vertical milling, drilling, profiling, etc., the fixture eliminates the necessity for providing elaborate jigs and fixtures. The provision of many accurately positioned surfaces from which working points can be established expedites set-ups for special machining, limited production, or inspection work, and insures that all operations will be accurately duplicated. The fixture is said to be accurate as regards squareness and parallelism of the parts within 0.0002 inch. 75

DoAll Powder-Metal Presses

The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has announced a powder-metal press of 30 to 60 tons capacity designed to assure proper density in the parts produced. The design of this new press is unusual in that the pressures are applied from top, bottom, and sides simultaneously through hydraulic cylinders. Variations in pressure on each cylinder are obtainable by adjusting valves on the control panel.



Hanson Work-holding Fixture Consisting of Precision Base, Two Sliding Mounting Blocks, and Accessories



DoAll Press Developed for Production of Powdered-metal Parts

Each top and bottom center cylinder and each pair of top and bottom outside cylinders, as well as the two side cylinders, are operated by separately driven Vickers 14-gallon, 2000 pounds per square inch pumps, driven by 20-H.P. motors operating at a speed of 1200 R.P.M. This unique cylinder set-up and ram arrangement adapts the press for the production of a wide variety of shapes of either cored or solid construction. The advantage of this type of hydraulic drive is that each set of cylinders can be individually adjusted for the rate of travel on both the power stroke and the return stroke. They can also be regulated to provide the correct pressure, as mentioned.

The rate of travel on the power stroke is adjustable from 0 to 100 inches per minute, and on the return stroke from 2 to 200 inches per minute. The press is equipped with positive mechanical stops for dimensional control, and relief valves are provided for density control.

The feed mechanism of the press is of the air injection type which assures uniformity in the quantity of material introduced into the die cavity. The press is operated as a fully automatic machine when employed on high-production runs. It is equipped with "jogging" buttons for controlling each motor when setting up the dies. The maximum production rate of the press is 150 parts per minute. 76

To obtain additional information on equipment described on this page, see lower part of page 212.

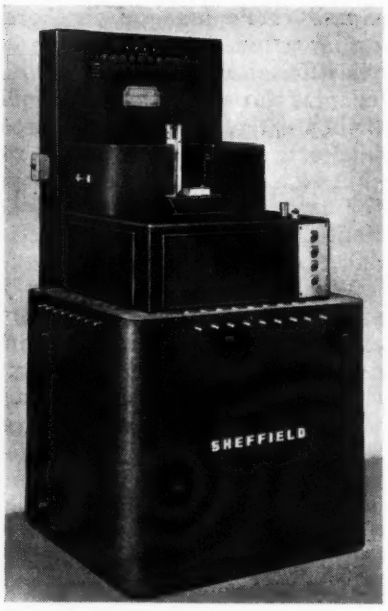
Commander Tapping Head

The Commander Mfg. Co., 4225 W. Kinzie St., Department M, Chicago 24, Ill., has recently developed a tapping head which will handle taps from No. 0 to 3/4 inch in size. The new tapper, in addition to having the capacity for handling an exceptionally wide range of tap sizes, is designed to fit any drill press.

This tapper has a patented spring-clutch drive and an adjustable torque control which are said to provide extreme sensitivity and a wide range of adaptability. It is especially suited for cycle tapping and external threading, as well as for routine machine tapping. Accurate blind hole tapping is easily accomplished, without damage to taps and equipment, because of the multi-torque control.

The spring-clutch drive is unaffected by oil, grease, moisture, or weather changes. A very slight pressure is required to engage and disengage the clutch, which operates smoothly and quietly.

The torque can be quickly and easily set to suit any size tap within the range of the tapping head. The adjustable torque control is preset for the tap size, and permits the tap to move into and out of the work with the required sensitivity, eliminating the need for a trained operator's touch. This feature assures maximum tap protection and accurate tapping even when inexperienced operators are employed. The torque can be adjusted when the tapper is on or off the drill press by merely pushing a button and turning the scale to the desired position for the tap to be used. 77



Sheffield Precision Gaging Machine

Sheffield Gaging Machine for Segregating Lapped Parts Automatically

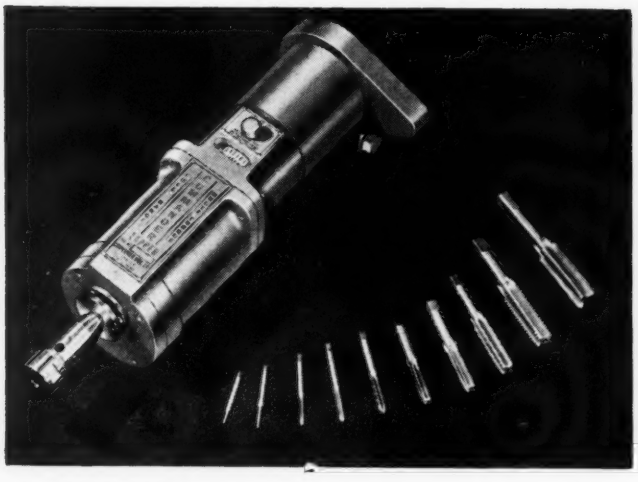
A gaging machine that automatically segregates lapped valve plates into twenty-seven classifications without marring them has been designed and built by the Sheffield Corporation, Dayton 1, Ohio, for a large manufacturer of electric refrigerators. The valve plates, about the size of a half dollar and twice as thick, are fed by hand into the vertical loading stack of the gaging machine. A motor-driven slide pushes the bottom plate from the stack into the gaging position. By means of air flow jets and Sheffield "Airlectric" gaging heads, the plates are checked for diameter and segregated into three 0.0004-inch major classifications. The plates in each of the major classifications are then checked for thickness and segregated into eight acceptable 0.0003-inch classifications.

The rejected parts are segregated according to the following classifications: (1) Under size on diameter or thickness; (2) salvage over size on diameter; (3) salvage over size on thickness. The rate of inspection is 3000 plates per hour. 78

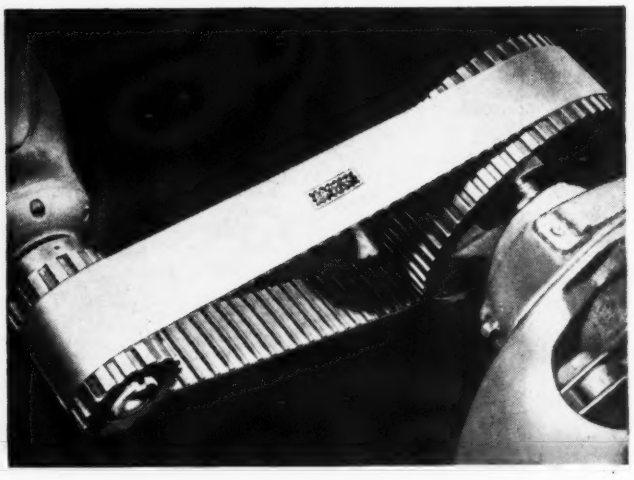
Slip-Proof Belt with Rubber Teeth

L. H. Gilmer Division, United States Rubber Co., Rockefeller Center, New York 20, N. Y., has recently developed a slip-proof belt with rubber teeth, which is adapted for use on machine tools, automobiles, and aircraft. This new belt is said to be exceptionally strong, highly flexible, and practically noiseless in operation. It is designed for use on machinery equipped with special pulleys that are grooved to fit the teeth in the belt.

The new belt is reinforced with steel cables embedded in oil-resisting synthetic rubber, which minimize belt stretch and eliminate the necessity for installing take-up devices for removing slack. In operation, it makes positive engagement with the pulleys at any speed ranging from practically zero to 10,000 feet per minute, insuring synchronization, as well as power transmission. It will be made in various sizes to suit the requirements of machine designers. 79



Tapping Head Brought out by the Commander Mfg. Co.



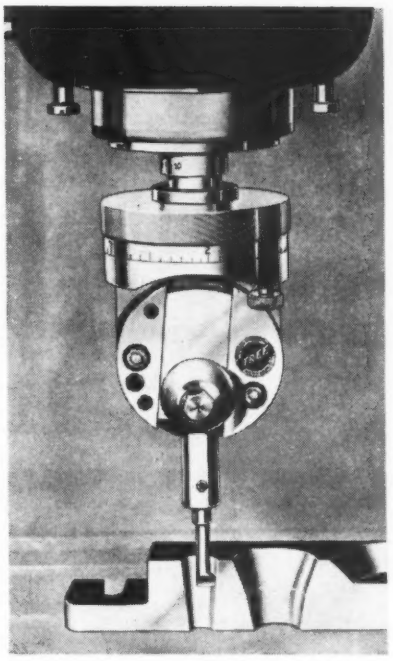
Gilmer Slip-proof Belt with Rubber Teeth

To obtain additional information on equipment described on this page, see lower part of page 212.

Taper Boring Tool

A taper boring tool designed for use on milling machines, jig borers, and boring-bars is manufactured by the Tree Tool & Die Works, Racine, Wis. This tool is 4 inches in diameter by 5 inches long, and is made of heat-treated precision-ground alloy steel. Its simplicity of operation and adaptability make it useful for boring metal patterns, dies, rubber or plastic molds, drop-forging dies, and similar work. The tool is capable of boring tool steels, cast iron, and non-ferrous metals.

In one set-up, straight boring, facing, and straight or taper outside turning can be performed, in addition to taper boring. The work need not to be moved for these operations, since all necessary adjustments can be easily made. The tool will bore holes up to 10 inches in diameter and with any desired taper. Taper boring is accomplished by setting the graduated swivel base to the desired angle, swinging the boring-bar into the cutting position, and holding the knurled ring stationary as the tool revolves. 80



Taper Boring Tool Brought out by the Tree Tool & Die Works

Universal Safety Work-Holder for Drill Press

The Universal Vise & Tool Co., Parma, Mich., has brought out a work-holder that can be easily fitted over the column of a drill press and adjusted for holding work while it is being drilled. A quarter-turn of the operating handles locks or unlocks the work locating and holding arms. The arms can be opened the full width of the drill press table or closed to accommodate work of any size or shape that can be supported by the table. The arms can be quickly removed from the table by simply unlocking and moving them to the rear position. The work-holder is made in seven sizes to fit drill presses with columns ranging from 1 5/8 to 4 inches in diameter. 81

Trico Unbreakable Oiler

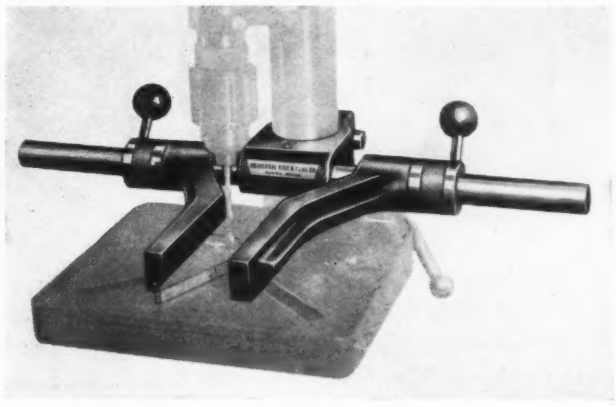
A new visible type unbreakable automatic oiler designed for use in places where the space between the oil-hole and some part of the machine is limited has been added to the line of the Trico Fuse Mfg. Co., 2948 N. Fifth St., Milwaukee 12, Wis. The feed spout is located at the side instead of the center of the oiler, making it possible to mount the oiler where there is a clearance of only 3/4 inch at one side of the oil-hole.

The new oiler will automatically lubricate solid, wick, or waste-packed bearings. A rod in the oiler that rides on the rotating shaft releases the oil from the plastic container when subjected to the slightest vibration or vertical movement. As the bearing becomes heated, the thermal action forces the oil on the bearing at a greater rate of feed. The feed stops, however, when the shaft is not in motion. The oiler is made in 1-, 2-, and 4-ounce capacities. It can be quickly installed by simply screwing a 1/8-inch threaded pipe adapter in place. 82

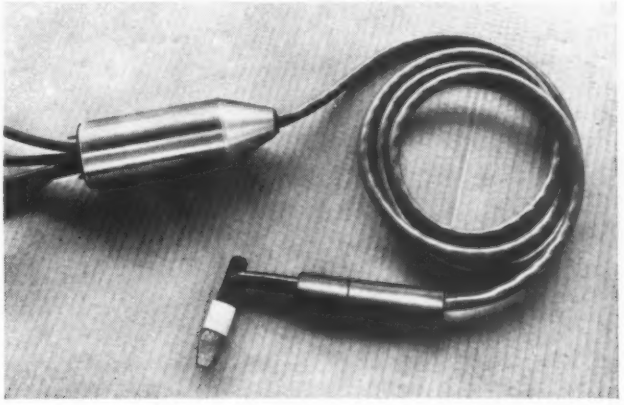
Airco Manual "Heliweld" Holder

A new water-cooled manual "Heliweld" holder, for continuous production work by the inert-gas-shielded arc-welding method, has been announced by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. This holder has an insulated plastic casing designed for maximum protection, a gas cap made of non-conducting material, and a light flexible cable encased in a durable translucent plastic cover.

The holder has a capacity of 300 amperes, alternating or direct current, and is fully insulated for the high-frequency current often needed for arc starting. The holder is approximately 10 inches long, weighs about 28 ounces, and takes tungsten or carbon electrodes up to 3/16 inch in diameter. 83



Drill Press Equipped with Work-holder Made by the Universal Vise & Tool Co.



Manual "Heliweld" Holder Brought out by the Air Reduction Sales Co.

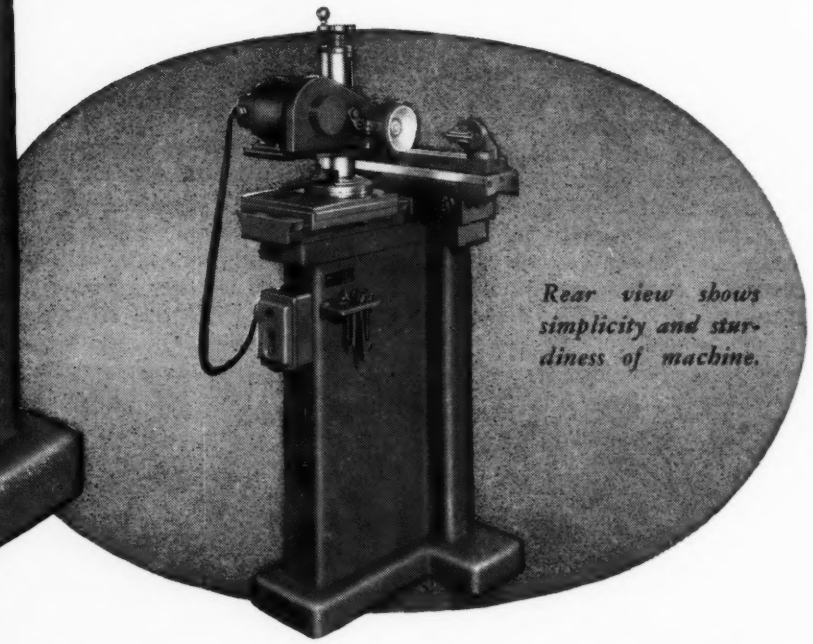
To obtain additional information on equipment described on this page, see lower part of page 212.

DEVELOPED TO SAVE YOU MONEY O

THE NEW No. 5 CUTTER AND TOOL GRINDING MACHINE

UNIQUE FEATURES

- ✓ **Double-ended ball bearing wheel spindle (super-precision, permanently-sealed, grease-lubricated bearings).**
- ✓ **Ingenious, roller-bearing table.**
- ✓ **4-location table crank or knob.**
- ✓ **Hollow, one-piece base, mounted on 3 points to preserve alignment.**
- ✓ **Additional equipment: Indexing equipment; Raising Blocks; Formed Cutter Sharpening Equipment; Collets for No. 5 & No. 7 B & S Taper Shanks; Draw-in Bolt; 3/8" and 3/4" Cutter Bars.**



Rear view shows simplicity and sturdiness of machine.

Centers swing 6 3/8" in diameter. Distance, center line of work to center of wheel spindle, greatest 8 1/8", least, 1 5/8". Distance, center of wheel spindle to top of table, greatest, 6 7/8"; least, 1 3/8". Write for complete specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN &

ON CUTTER AND TOOL GRINDING

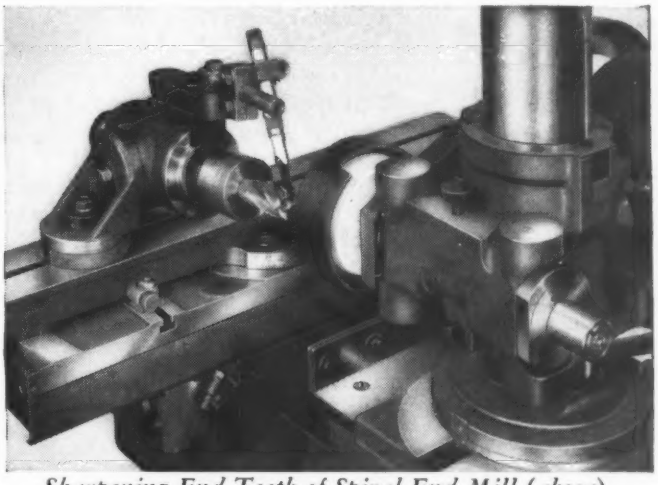
NEW OPPORTUNITIES

are now available for important improvements in your tool room efficiency through the compact, versatile and extremely sensitive Brown & Sharpe No. 5 Cutter and Tool Grinding Machine. It is specifically designed to handle a large share of tool room sharpening jobs . . . all types of small cutters, especially end mills . . . also reamers and similar tools. Handy in size and unusually flexible, it simplifies and speeds up cutter and tool sharpening.

Easy-gliding, roller-bearing table makes operation extremely simple and accurate.

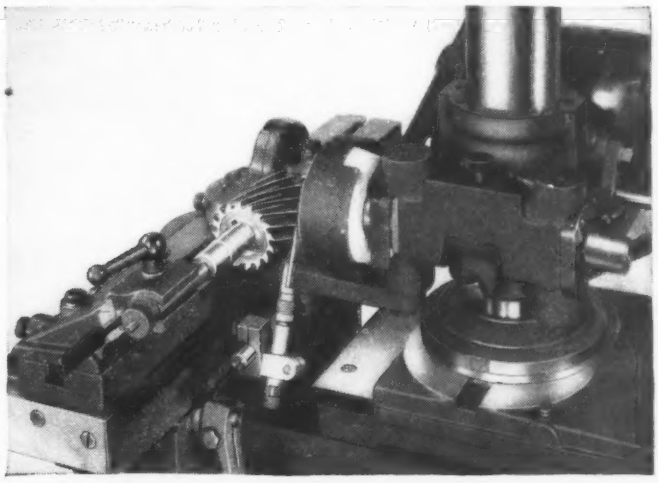
✓ SAVE ON SET-UPS AND OPERATION

The super-sensitive operation of this No. 5 machine . . . readily responsive to a light touch from the operator . . . makes set-ups and operation fast and easy. It is the result of an ingeniously-designed table which slides on 36 precision-ground rolls . . . plus lighter weight parts, engineered for fast and accurate sharpening. Most desirable work center height, conveniently located controls, and small machine size also facilitate set-ups and operation.



Sharpening End Teeth of Spiral End Mill (above).

Sharpening Plain Milling Cutter (below).

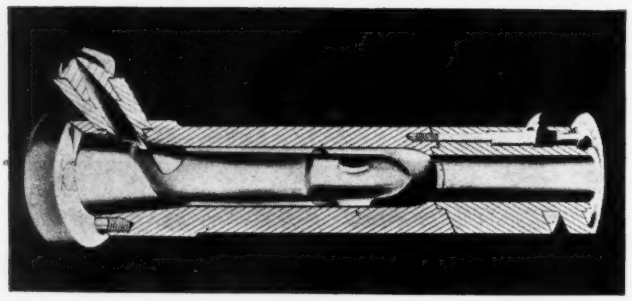


✓ SAVE ON FLOOR SPACE AND INVESTMENT

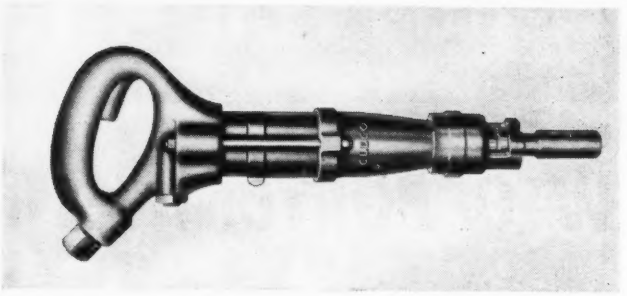
For a moderate investment, the No. 5 Machine will do much of the work that has been done frequently on larger, more expensive machines. On the basis of smaller overhead and space alone, it will reduce the unit cost of sharpening many cutters and tools.

SHARPE

B·S



Injection Cylinder for Plastics Molding Machine Made by Lester-Phoenix, Inc.



Cleco "Handi-Drill" having Combined Rotary and Oscillating Movements

Lester-Phoenix Improved Injection Cylinder for Plastics Molding

Lester-Phoenix, Inc., Cleveland, Ohio, has announced the development of an injection cylinder with independent temperature control in its spreader and a completely annular material passage. This development is an outgrowth of original experiments with internal heating of the spreader section.

This new injection cylinder, designed as a general-purpose unit for use in molding thermoplastics, including Vinylite and nylon, is said to make possible the successful molding of larger pieces on more intricate molds. The excellent plasticizing qualities of this new design promise to reduce the power required for operating the pumps and the current needed for heating the material, as well as the maintenance cost, while at the same time making possible increased production. 84

Cleco "Handi-Drill"

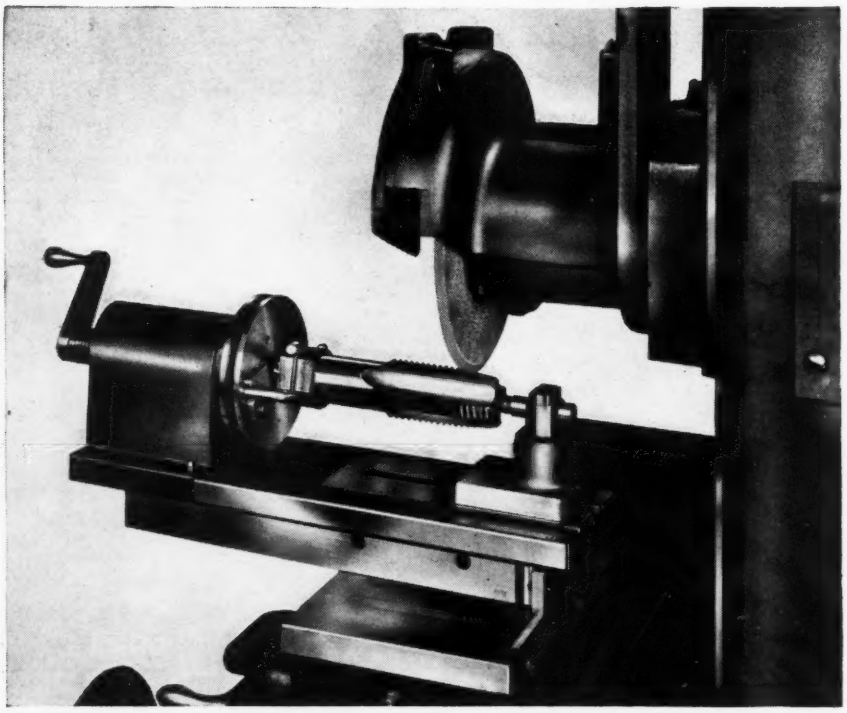
A light-weight hand-held drill which hits a blow and rotates simultaneously has been developed by the Cleco Division of the Reed Roller Bit Co., P. O. Box 2119, Houston, Tex. This drill can be operated with one hand, and is especially adapted for working in close quarters and in all types of masonry. It has a patented safety retainer which prevents accidental release of the drill from the tool. The drill weighs 9 pounds, is 13 inches long, and has a capacity for drills from 1/4 to 3/4 inch in diameter.....85

Tinker Thread Grinder Attachment

A unique thread grinder having a capacity for holding work up to 8 inches in length between centers for grinding right- or left-hand threads of any shape in sizes up to 4 7/16 inches in diameter has been announced by Tinker's Thread Grinder Co., 169 Granby Road, South Hadley Falls, Mass. This thread grinder is 18 inches long and weighs about 26 pounds. It can be used on practically any surface grinder, and can be held in place on a magnetic chuck, as shown in the accompanying illustration.

The work is rotated and fed past the grinding wheel by a hand-crank attached to a master lead-screw. The lead-screw is connected directly to a live-center faceplate mounted on the slide with the tailstock. A 4-inch sine bar is provided for setting the work to suit the helix angle of the thread to be ground. The tailstock can be adjusted to compensate for errors or for grinding a tapered thread. The grinding wheel is, of course, dressed to grind the thread to the required form.

Hardened and ground lead-screws and bronze nuts are furnished for grinding threads of different leads. Specially designed lead-screws can also be supplied for grinding circular form tools requiring radial relief. Provision can also be made for backing off the chamfer on taps and for sharpening counterbores, step-drills, countersinks, and similar tools that can be mounted on centers.....86



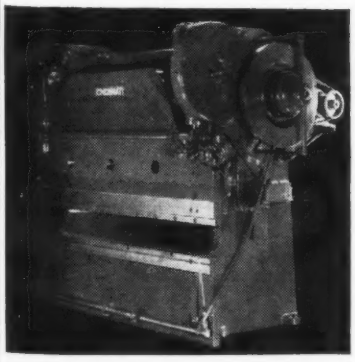
Tinker Thread Grinder Mounted on Magnetic Chuck of Surface Grinder

To obtain additional information on equipment described on this page, see lower part of page 212.

DRAWING

ANOTHER JOB OCCASIONALLY DONE ON CINCINNATI PRESS BRAKES

96" frame, 3" to 7" wide, 2½" flange, of 12-gauge high tensile steel.



Standard Cincinnati Press Brakes are furnished with die surfaces from 4 feet to 30 feet.

Drawing is unusual on a Press Brake, but is done successfully within reasonable limits.

This Press Brake brought low cost and clean-cut production in the manufacturing of these trailer frames.

The three advantages—low investment—accurate performance—rapid rate of production—all contribute to high return on investment.

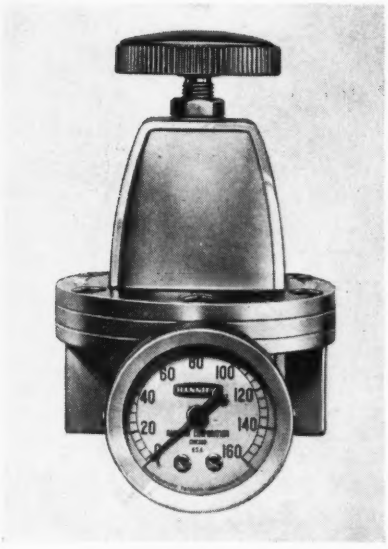
The many functions and the economical applications of Cincinnati Press Brakes may bring steady profits in your shop.

Write for Catalog B-2, which illustrates many uses, as well as the extensive line of Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



Hannifin Pressure Regulating Valve for Compressed-air Supply Lines

Hannifin Air-Pressure Regulating Valve

An improved automatic pressure regulating valve designed specifically for service on compressed-air supply lines is a new product of the Hannifin Corporation, 1101 S. Kilbourn Ave., Chicago 24, Ill. This valve can be used on initial, or primary, air pressure lines with pressures up to 150 pounds per square inch, and can be set to maintain reduced or secondary pressures ranging from 125 down to 5 pounds per square inch. Through the use of an ingenious "free floating" valve stem, it is possible to reduce the delivered pressure under dead-end conditions by merely turning the adjusting screw, thus providing for high precision control.

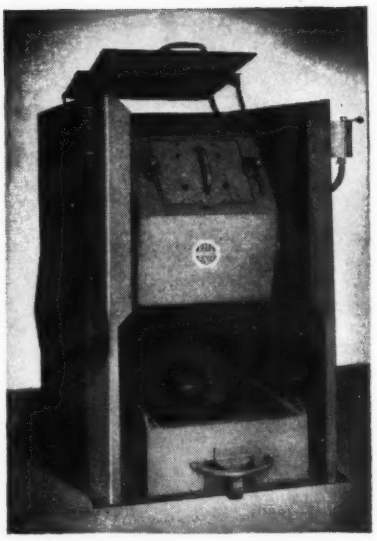
All parts of the valve are made of non-corrosive materials, die-cast parts being treated to prevent corrosion, and the valve seats are of nylon. The diaphragm of the valve is of textile reinforced synthetic rubber. All internal parts are accessible without disturbing the pipe connections.

The new regulating valve is available in two models, one for 3/8-inch line piping and one adapted for 1/2-inch connections...87

Sturgis "Roto-Finish" Machine

A one-compartment "Roto-Finish" machine for small mechanized deburring and finishing installations has been added to the line of the Sturgis Products Co., Sturgis, Mich. This machine is especially designed for the economical processing of small parts through the use of "Roto-Finish" grinding, deburring, and "Brite-honing" or coloring.

The inside dimensions of the cylinder are 19 by 32 inches. This compartment is lined with replaceable kiln-dried hard wood maple and equipped with a full size, light-weight door with newly designed molded rubber gasket, firmly held in place by fast-action cam locks.



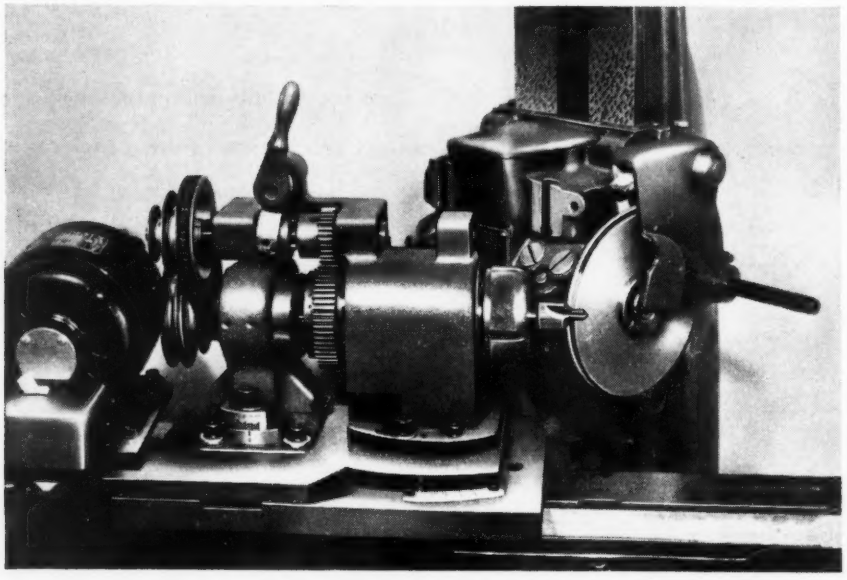
Small Size "Roto-Finish" Machine Built by Sturgis Products Co.

The equipment includes a forward and reversing switch with synchronized magnetic brake to facilitate loading and unloading, and a 1 1/2-H.P. motor with gear reducer.....88

Form and Radial Relief Grinding Attachment

An attachment for grinding form relief, radial relief, or both simultaneously, on a wide variety of small tools has been developed by the Detroit Reamer & Tool Co., 2830 E. Seven Mile Road, Detroit 12, Mich. This "circularity grinder," as it is called, is applicable to any conventional cylindrical or cutter grinder, and when not being used for grinding cutting tool relief, it serves as an ordinary motor-driven headstock. As the spindle of the attachment revolves, a simple cam generates the required relief on the tools; the same cam is used for all tools, the amount of relief being easily changed by scale adjustment.

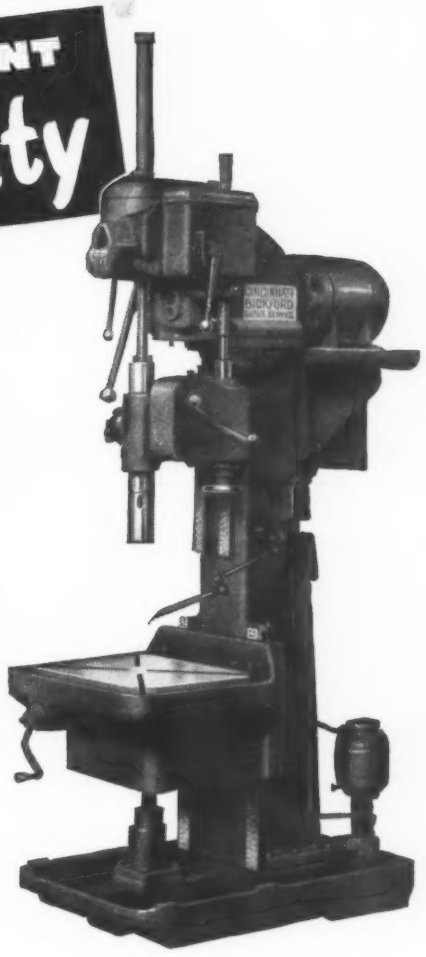
Work up to 1 1/4 inches in diameter can be held in the collet chuck. The work can also be held between centers, a simple attachment being provided which can be set up in a few minutes. One important feature of this attachment is that no matter how much or what type of relief is required, the tool always revolves on its own axial center. Another advantage is that, once the set-up is made for grinding relief on a tool, hundreds of tools can be ground



Attachment Developed by the Detroit Reamer & Tool Co. for Form and Radial Relief Grinding of Cutting Tools

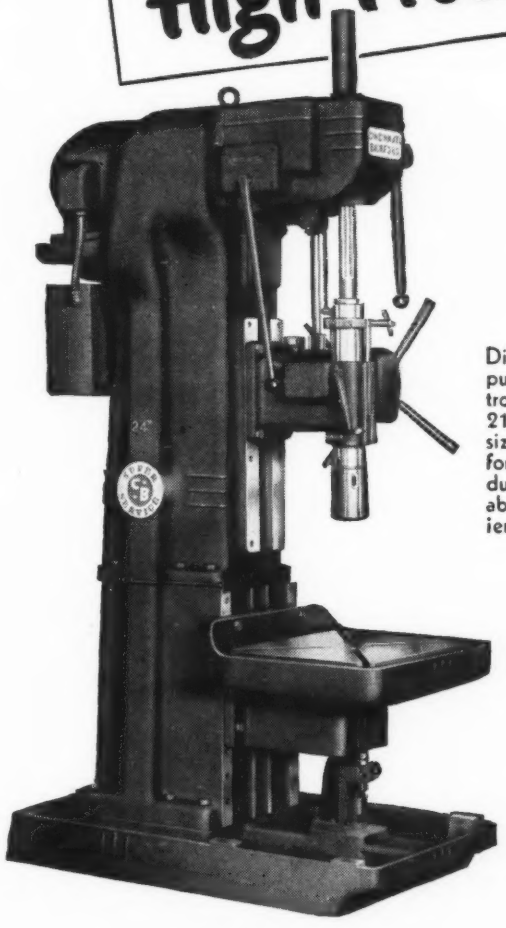
To obtain additional information on equipment described on this page, see lower part of page 212.

WHEN YOU WANT Versatility



All geared, sturdy, accurate and versatile, furnished in 21", 24", 28" sizes. Built in both box type and round type to suit the particular need.

WHEN YOU WANT High Production



Direct Drive, with push button control of motor—in 21", 24" or 28" sizes. Simplified for low cost production, yet adaptable and convenient.

Opportunity of selection means increased value to the buyer—the power to select exactly the machine suited to the particular job.

Cincinnati Super Service Upright Drills are built in production, and all geared types—one for high production, and on the other, versatility of performance.

Both types of these modern, up-to-date upright drills are sturdy, fast and rigid. They give long, trouble-free performance, and assure the user "low cost per hole."

Write for bulletin U-27 (Direct Drive Production Super Service Uprights) and bulletin U-25 (All Geared Super Service Uprights).

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

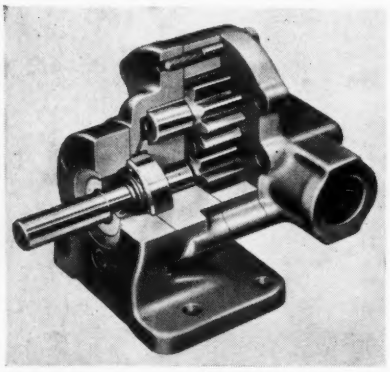
Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

with identical relief. If a record of the set-up made from the scales on the attachment is kept, the set-up can be duplicated whenever the same relief is required.....89

Adel Geared Pump for Hydraulic Systems

The Adel Precision Products Corporation, Burbank, Calif., is producing a new gear type hydraulic oil-pump adapted for a wide variety of applications. This pump is designed for service requiring pressures up to 1000 pounds per square inch, and is



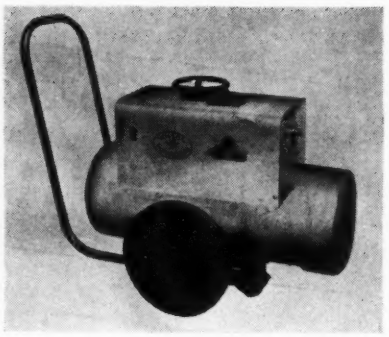
Cut-away View Showing Construction of Adel Hydraulic Pump

available in various models with rated capacities of 1.5 to 60 gallons per minute at 1800 R.P.M. Each model is available in a choice of mountings, including foot and flange types. The special oil seal used on the drive-shaft is shown in the cut-away view in the accompanying illustration.

A ball bearing on the drive-shaft absorbs all thrust and radial loads imposed by the drive. A feature of the pump design is a unique ball drive, which permits the gears to float endwise on the shafts. This prevents any thrust loads from being transferred from the shaft to the gears or end plates, and also assures accurate alignment of the gears.....90

Heavy-Duty Arc-Welding Machine

The Wilson Welder and Metals Co., Inc., Department 1609P, 60 E. 42nd St., New York 17, N. Y., has developed a new Hornet motor-generator arc-welding machine



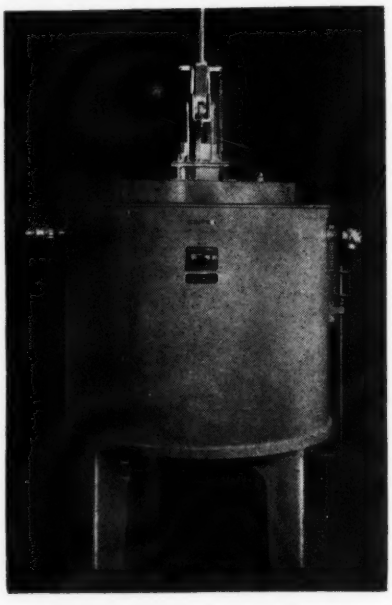
Hornet Motor-generator Arc-welding Machine

which is available in capacities of 200, 300, and 400 amperes. This welder is a heavy-duty machine with simple current controls that are easy to adjust and pre-set accurately. It is designed to operate on either 220 or 440 volts, no change in relays or additional wires being required for voltage reconnection.

The special features of the machine include small size and light weight, drip-proof construction, and moisture-proof insulation...91

Homo Tempering Furnace

High-precision tempering can be performed continuously at a temperature of 1650 degrees F. in a new series of Homo furnaces recently announced by the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa. High-temperature stress relief, cycle



Homo Furnace Developed for Continuous Tempering Operations

annealing, spheroidizing, normalizing, and similar heat-treatments for ferrous and non-ferrous parts are typical operations for which this new furnace is adapted. Lower-temperature work can be handled in the same furnace with equal efficiency.

The high-temperature furnaces will handle large dense loads on a mass production basis. Capacities vary from 1.8 to 33.4 cubic feet. These compact furnaces require little space for installation in pits or on the floor, and are usually incorporated directly into the production line to eliminate special routing of the work.....92

"Shearcutter" Circular Cutter Bit

"Shearcutter" Circular Cutter Bit with Precision Holder

The Shearcut Tool Co., Box 746, Reseda Post Office, Los Angeles, Calif., has developed a new "Shearcutter" boring, turning, and facing tool for use on lathes, screw machines, and boring machines. The outstanding feature of this tool is the circular cutter bit made from high-speed steel. The blade is fastened securely to the end of a specially designed holder in such a manner that a shearing action is attained. As a result of this knife-like action, a mirror-like finish is produced and there is a great reduction in the amount of frictional heat developed by the cutting action.

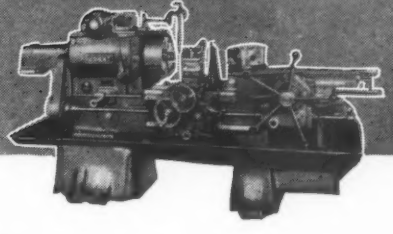
An outstanding advantage of the cutter bit is that it permits twenty to fifty new sharp cutting edges to be presented to the work by simply rotating the bit. This eliminates the necessity of stopping production to remove and resharpen the tools. When resharp-

To obtain additional information on equipment described on this page, see lower part of page 212.

GISHOLT TURRET LATHES

Hydraulic speed selector cuts operator's time as much as 30% —and insures better work

It's power-operated. No manual gear shifting, no needless effort, no waste time between cuts. It increases efficiency on all kinds of turret lathe jobs.



GISHOLT MACHINE COMPANY, *Madison 3, Wisconsin*

...the Gisholt round table represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

turret lathes • balancers automatic lathes • superfinishers • special machines

ening becomes necessary, the circular bit can be easily removed and quickly resharpened. The life of the cutting edges of this tool is said to be greatly increased because of the shearing action and the way in which the chip slides back over the cutting edge, tending to keep it sharp. 93

Roto-Cone Variable-Pitch Pulley

Roto-Cone variable-pitch motor pulleys of the design shown in Fig. 1 are now being made in sizes with power ratings of 1/8 to 7 1/2 H.P. by the Gerbing Mfg. Corporation, 154 E. Erie St., Chicago 11, Ill. All sizes of these new pulleys are designed with a double rack and pinion arranged as shown in Fig. 2, to provide an equal and uniform movement of the two sheave faces in opposite directions when the effective diameter is being increased or decreased. This results in maintaining a constant belt center line, which enables a V-groove driven sheave to be used. The spring enclosed in the pulley hub, as shown in Fig. 2, provides the pressure necessary for maintaining the proper belt tension. Electronic balancing of the complete unit after assembly serves to eliminate noise and chatter. The pulley may be mounted either vertically or horizontally.

All sizes of this pulley furnish infinite speed variations within a 3 to 1 ratio except the 1/8-H.P. size, which has a 2 1/4 to 1 ratio. Stepless speed changing, with one of the pulleys mounted on the motor-shaft and with the motor mounted on a Roto-Cone adjustable motor base, is obtained by adjustment of the base handwheel. In operation, when the motor is adjusted in the direction of the driven shaft, the speed of that shaft is increased, since the tension on the belt is released, permitting the spring in the pulley housing to force the sheaves toward each other and thus increasing the effective diameter of the driving pulley. The speed of the driven shaft is reduced by adjusting the motor away from the shaft. 94

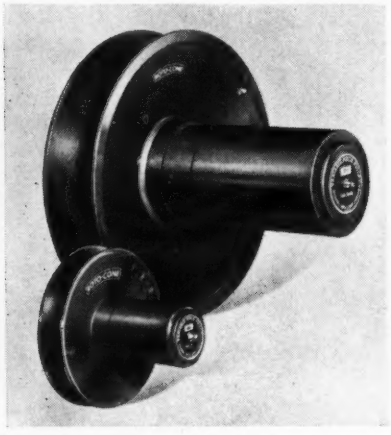
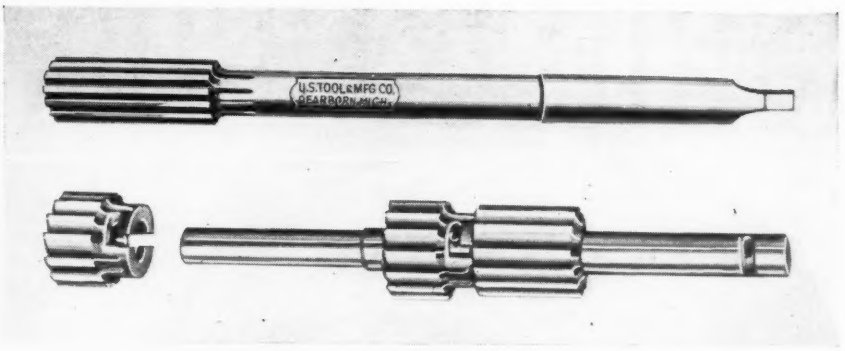


Fig. 1. Gerbing Roto-Cone Variable-pitch Pulley



High-speed Reamers Made by U. S. Tool & Mfg. Co. through the Use of a New Rolling Process

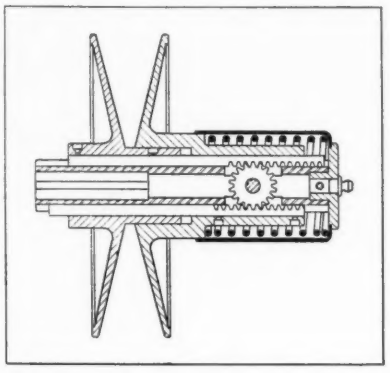


Fig. 2. Cross-section of Variable-pitch Type of Pulley Shown in Fig. 1

High-Speed Reamers Made by New Process

An entirely new procedure for making standard and special high-speed reamers, in which cutter blades of high-speed steel are firmly secured in recesses of a low-carbon steel body by means of a patented rolling process, has been announced by the U. S. Tool & Mfg. Co., 6906 Kingsley Ave., Dearborn, Mich. The new rolling process involves no application of heat, as in welding and brazing, and thus cannot affect the temper, hardness, and durability of the cutter blades. Worn and undersize reamers can be rerolled at the factory several times to restore them to their original cutting sizes. 95

Deep-Hole Inspection Light

A light developed specifically for production-line inspection of the bottom and sides of small deep holes in machined or cast parts has been placed on the market by the Extractor Corporation, 25743 W. Seven Mile Road, Detroit 19, Mich. This light provides good visibility in holes 1/8 inch in diameter up to 6 inches deep or in holes 1/4 inch in diameter up to 30 inches deep.

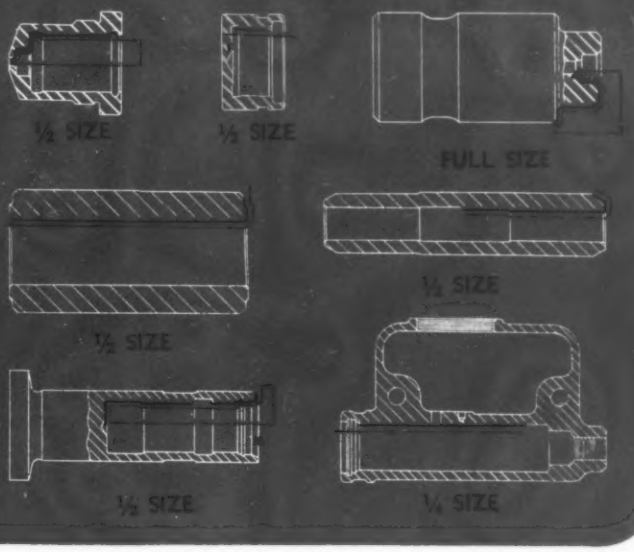
The light is made in two convenient forms—a portable type for inspectors and a bench design for multiple inspection work. The bench light is used with a separate transformer and a reel for the connecting cord. 96

Deep-hole Inspection Light Made by the Extractor Corporation

To obtain additional information on equipment described on this page, see lower part of page 212.

New boring and turning machines TO BROADEN YOUR PROFIT MARGIN

Model 36



On one of the parts illustrated the bore specifies a .0005 back taper. Many bores have a .001 total limit. On one job the production rate is 1,080 pieces per hour; on another, production was increased from 180 to more than 300. Specifications for the valve guide call for a .0001 limit on size from one end to the other, .0002 for concentricity, and a .0006 limit from piece to piece.

Money-saving speed, accuracy and ease of operation make this new line of precision contour turning and boring machines earn their way. Cam and air actuated, the tools positively repeat from piece to piece unaffected by temperature variations.

High production is assured by high spindle speeds and lifetime sealed lubrication of spindle bearings, and by the fact that 2 or more pieces are finished simultaneously with rapid traverse on all idle motions.

An unlimited variety of set-ups can easily be arranged. In addition to straight boring and turning, facing and chamfering, it will accurately follow contours cut on its cams, and will produce lands, recesses, flanges, steps, counterbores, and radii . . . all with a single point tool. Only one dimension cut by this tool requires inspection.

The Machine Tool Show unquestionably demonstrated the enormous new possibilities of automatic machinery. Are you falling behind your competitors by not at least investigating? We will gladly show you how we are changing expensive boring and turning operations into profitable productivity. *Productivity, not price, is the measure of a machine.*

NEW BRITAIN AUTOMATICS COST LESS PER FINISHED PIECE.

THE NEW BRITAIN MACHINE CO.

NB

NEW BRITAIN

Automatics

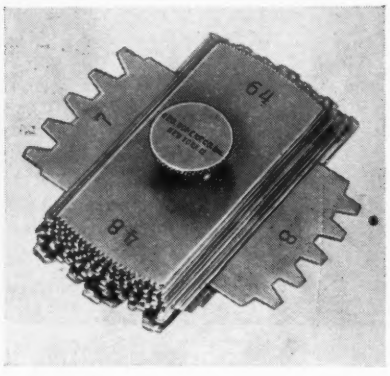
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

248MJ1

Gear-Tooth Gage Templets

A highly polished stainless-steel gear gage, which can also be used as a paper weight by gear manufacturers, engineers, designers, mechanics, estimators, and others, has been introduced by the George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y. As illustrated, the device is composed of twelve leaves which include twenty-four different gear-tooth shapes of diametral pitches ranging from 3 to 64.

The teeth of these gaging templets are of the correct involute



Stainless-steel Gear-tooth Gage

shape. The segment blanks of each pitch are machined to conform to the full diameter in accordance with the number of teeth for the full gear. The gages can be used as a quick means for checking gears, providing a convenient method of visualizing the size and strength of gear teeth and checking the finished gear for diametral pitch. The gage teeth are made with a pressure angle of 14 1/2 degrees, but if desired they can be made with a pressure angle of 20 degrees and in circular pitch styles. Other shapes or templets of concave or convex contours or profiles can also be furnished. 97

Erickson Special Grinding Fixture and Air-Operated Mandrel

The Erickson Tools Division, 2309 Hamilton Ave., Cleveland 14, Ohio, has just developed a special grinding fixture in which an Erickson 18-A-1 expanding faceplate mandrel is incorporated for holding the work by gripping the major diameter of an internal

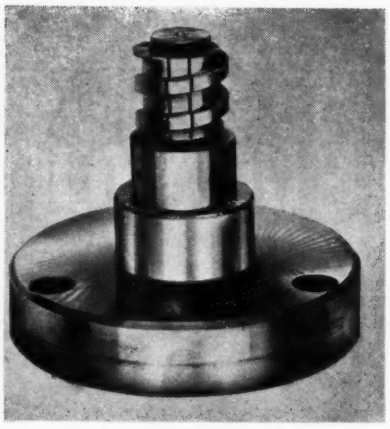


Fig. 1. Grinding Fixture with Expanding Mandrel Developed by Erickson Tools Division

Acme thread. The draw-bar operated mandrel of this fixture is equipped with locators, as shown in Fig. 1.

The new special double-sleeve air-operated mandrel shown in Fig. 2 combines an Erickson precision mandrel and an air cylinder. With this mandrel, steel tubing having inside diameters ranging from 2 1/2 to 3 inches can be held automatically for straddle-facing and turning operations, the Erickson air principle being utilized to actuate the special draw-bar mandrel. By removing the mandrel assembly and substituting two simple air-chuck parts, the fixture can be quickly converted to a standard type air-operated collet chuck. 98

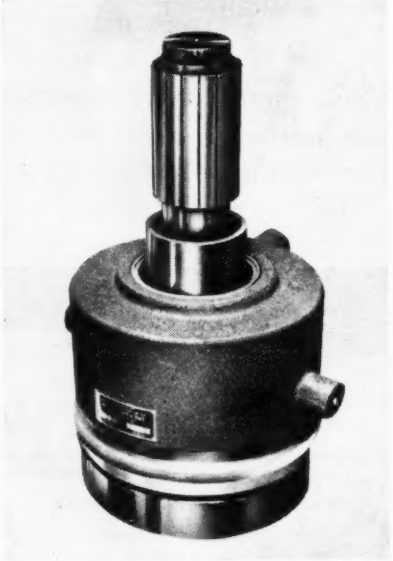


Fig. 2. Erickson Special Double-sleeve Air-operated Mandrel

High-Speed Electric Impact Nut-Setter

An electric torqueless, impact nut-setter, designated the "Speed-O-Matic," is being made by the Illinois Gage & Mfg. Corporation, 4639 W. Washington Blvd., Chicago 44, Ill. This light-weight heavy-duty tool is designed to enable nut-setting work to be performed faster and with less fatigue to the operator. The torqueless feature prevents the tool from twisting in the operator's hands when the nut becomes tight.

The nut-setter drives a nut or bolt at a free speed of 1750 R.P.M. On meeting resistance, it automatically delivers impact blows at the rate of 3000 per minute. The unit can be reversed instantly for removing bolts or nuts. The tool

"Speed-O-Matic" Impact Nut-setter

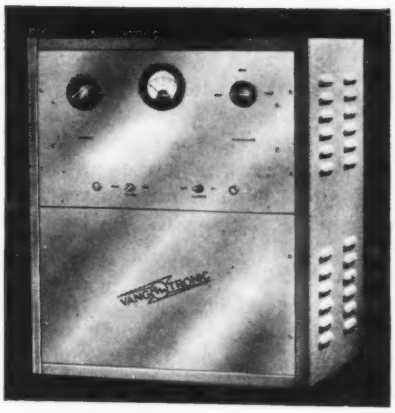
has an over-all length of 12 1/2 inches and weighs 13 1/2 pounds. It has a capacity for setting nuts and bolts up to 3/4 inch. 99

Universal Grinding Coolant

Machinery Lubricants, Inc., 31 St. James Ave., Boston 16, Mass., has developed a precision grinding compound designated "Silver Chip No. 2." The new coolant is adaptable for use in grinding steel, copper, aluminum, brass, and cast iron.

By the use of this coolant, grinding wheels and machines are kept cleaner; wheels of finer grit and harder grades can be used without "burning"; rust is eliminated; less wheel dressing is required; and a smoother finish is obtained on the work.....100

To obtain additional information on equipment described on this page, see lower part of page 212.



Vangtronic Unit for Converting Welders to Stored-energy Operation

Unit for Converting Alternating-Current Welders for Stored-Energy Operation

The Vangtronic Corporation, 237 John St., Bridgeport 3, Conn., now has available a new unit for converting alternating-current spot-welders for stored-energy operation. This unit has been developed to meet the demand for equipment adapted for spot-welding aluminum and other high-conductivity metals and alloys, with the possibility of making substantial reductions in the unit cost of the operation.

The units are made in several models. The model illustrated is a 210-microfarad 1500-volt stored-energy unit operating on a 110- to 120-volt 50- to 60-cycle alternating-current power line with a welding speed of 30 to 180 spots per minute. This unit can be connected to conventional alternating-current welding machines of from 3- to 10-K.V.A. ratings. The other models are applicable to machines of lower and higher ratings.

The stored-energy welding process gives a very brief but intense electrical discharge, which permits some materials to be welded with less distortion, deformation, discoloration, and crystal growth. It is claimed that the electrodes will also have much longer life when this method is employed. 101

Westinghouse Vertical Gearmotor

A new vertical self-contained gearmotor drive has been added to the line of gear drives made by the Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. The drive consists of a high-speed motor and speed-reducing unit. Nine different gear ratio combinations are available, ranging from 7.61 to 1 up to 38.9 to 1. The units are made in capacities ranging from 3 to 50 H.P., for operation on 220-, 440-, or 550-volt, three-phase alternating current, and in 3- to 7 1/2-H.P. 115- or 230-volt direct-current types. They can be equipped with practically any standard motor in a variety of enclosures.

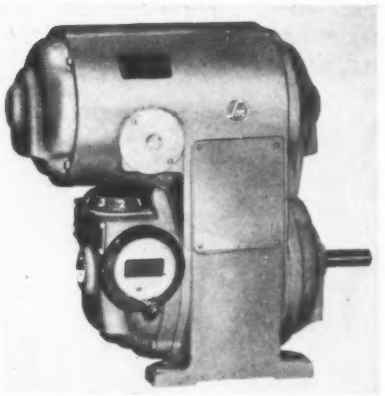
Special features include a gear-case so designed that all gears and bearings receive positive lubrication at all operating speeds. Quiet operation is obtained by em-

Westinghouse Vertical Type Gearmotor Unit

ploying single helical gears and pinions of 40 to 50 point carbon steel which have been given the "Tough-Hard" heat-treatment before hobbing. 102

Sterling Improved "Speed-Trol" Variable-Speed Drives

Sterling Electric Motors, Inc., Los Angeles 22, Calif., has brought out an improved "Speed-Trol" variable-speed drive which provides finger-tip control throughout its entire speed range. This drive is more ruggedly constructed than preceding models, and combines the motor and speed control in one compact unit. The new drive is said to occupy approximately one-half the space required for previous variable-speed electric power drives. It conforms

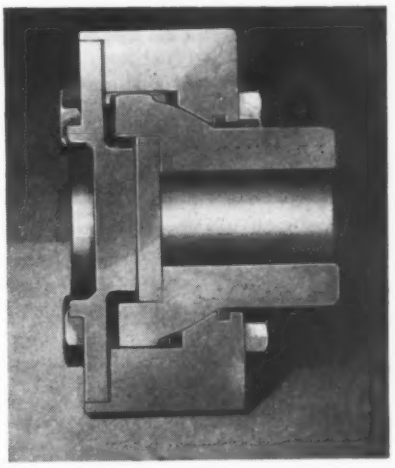


Improved Variable-speed Drive Built by Sterling Electric Motors

to the regular specifications for N.E.M.A. electric motor mountings. 103

"Sphere-Gear" Shaft Coupling

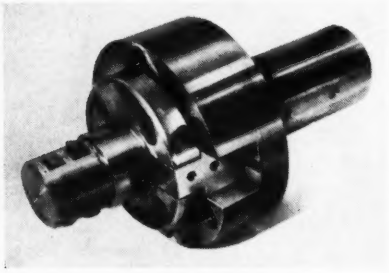
A new type of flexible coupling known as the "Sphere-Gear" has been brought out by the Dykman Mfg. Co., 3931-35 Falls Road, Baltimore 11, Md., in three sizes having maximum bores of 1 1/8, 1 3/8, and 1 3/4 inches. Although originally designed primarily to take the place of rigid couplings on marine propeller shafts, this coupling can also be employed advantageously on various machine, locomotive, and aeronautical installations where the elimination of vibration is an important factor. It is designed to take care of forward and reverse thrust with angular misalignments and to eliminate the forces that previously have given trouble through



"Sphere-Gear" Shaft Coupling Made by Dykman Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 212.

their destructive effect on such parts as the packing glands of propeller shafts. 104

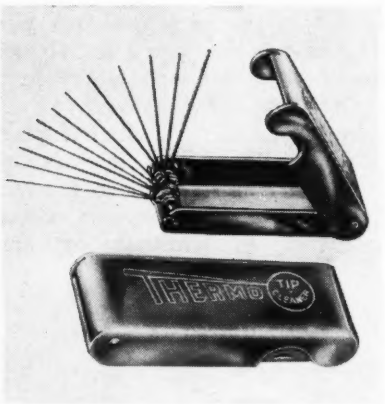


Combination Boring and Facing Tool Made by the Maxwell Co.

Maxwell Combination Boring and Facing Tool

A combination boring and facing tool designed to perform four operations at one set-up of the work has been developed by the Maxwell Co., 420 Broadway, Bedford, Ohio. This self-contained tool will perform rough- and finish-boring operations within a tolerance of 0.001 inch and then rough- and finish-face the work with power feed. All parts of the tool are hardened and ground. Carbide-tipped cutters can be supplied when desired. The actuating sleeve can be connected to any push- or pull-rod which is hydraulically, pneumatically, or mechanically operated. The tools are applicable to any machine equipped with a standard spindle nose.

These tools are made in two sizes. The larger-sized tool will bore holes up to a diameter of 5 5/16 inches, and has a travel of 1 inch for facing work up to a maximum diameter of 7 5/16 inches. The smaller tool, shown in the illustration, will bore holes to a minimum of 1 7/8 inches in diameter, and has a travel of 3/4 inch for facing work up to 3 3/8 inches in diameter. 105



Welding-tip Cleaners and Case

Welding-Tip Cleaners

A newly designed set of cleaners for acetylene welding tips, contained in an aluminum case, is being offered to the trade by the Thermacote Mfg. Co.. 420 S. San Pedro St., Los Angeles 13, Calif. The standard set of twelve cleaners can be used to clean tips drilled in twenty-seven sizes from drill sizes No. 74 to No. 49, while a special set can be utilized for tips drilled with No. 47 to No. 30 drills. A list of cleaner sizes to be used with the various drill numbers is engraved on the back of each case. 106

Huppert Temperature Controllers for Electric and Gas Units

A new series of temperature controllers for electric and gas heating units has been placed on the market by the K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill. These stepless input controllers are available with or without pyrometers, and are suitable for use on electric and gas furnaces, ovens, pots, and similar applications. Only a small portion of the current passes through the heating elements, and practically no resistance is used, so that no current is wasted by the controller. Gas equipment is controlled through a solenoid valve. These controllers operate on 115-volt alternating current.....107

Temperature Controller Made by the K. H. Huppert Co.

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described in this section is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in February, 1948, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

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New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 217 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the February, 1948, Number of MACHINERY

Cutter Grinder Instruction Manual

INGERSOLL MILLING MACHINE CO., Rockford, Ill. Operator's Instruction Manual (Catalogue 57), describing the details of the new Ingersoll cutter grinder—its application; procedure for sharpening milling cutters with carbide, cast-alloy and high-speed steel blades; and recommended grinds for various types of face mills to be used on different materials. Repair and maintenance data are included. 1

Reinforced Plastics

OWENS-CORNING FIBERGLAS CORPORATION, Toledo 1, Ohio. Booklet containing data on the properties and applications of Fiberglas-reinforced plastics including twenty-two charts prepared to help the designer select the type of Fiberglas reinforcement that will best meet his requirements. 2

Certified Alloy Steels

JOSEPH T. RYERSON & SON, INC., P.O. Box 8000-A, Chicago 80, Ill. Booklet listing sizes, shapes, finishes, and conditions of Certified alloy steels available for immediate shipment from Ryerson Steel Service warehouses. Tables of standard steel compositions are included. 3

Power Transmission Equipment

T. B. WOOD'S SONS CO., Chambersburg, Pa. Booklet entitled "Doing One Thing Well through Four Score Years and Ten," briefly describing and illustrating the manufacturing facilities of the company for producing power transmission equipment. 4

Standardized Hydraulic Presses

HANNIFIN CORPORATION, 1101 S. Kilbourn Ave., Chicago 24, Ill. Bulletin 13G, listing seventy-five standard hydraulic presses ranging in capacity from 6 to 150 tons, for straightening, forcing, forming, assembling, broaching, and similar operations. 5

Hydraulic Die-Casting Machines

HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio. Bulletin 4805-A, containing complete details and specifications covering two new smaller capacity models of H-P-M hydraulic die-casting machines for zinc and aluminum alloys. 6

Stampings

PRESSED METAL INSTITUTE, 829 Union Commerce Bldg., Cleveland 14, Ohio. Fourth edition of the "Blue Book of Stamping Manufacturers," containing an alphabetical and geographical list of the members of the Institute, available to designers and users of stampings upon request. 7

Hydraulic Surface Grinders

PRATT & WHITNEY DIVISION NILES-BEMENT-POND CO., West Hartford 1, Conn. Circular 494, containing complete description and specifications covering the P & W heavy-duty hydraulic vertical surface grinder, which has been completely redesigned. 8

Soldering and Heating Torches

SULLY ENGINEERING LTD., 7416 Melrose Ave., Los Angeles 46, Calif. Leaflet describing the features of the new Crown self-contained soldering and heating torch, with finger-tip control of flame size and temperature. 9

Turret Lathes

GISHOLT MACHINE CO., Madison 3, Wis. Circular entitled "Now My Idea Is... from Gus of Gisholt," containing a historical article on western steamboats and an outline of the development of turret lathes through the last sixty years. 10

Flexible Metal Hose

CO-OPERATIVE INDUSTRIES, INC., Chester, N. J. Circular on "Duraflex" flexible metal hose, describing the construction and giving engineering data on pressures and recommended sizes for various applications. Complete hose and fitting data is included. 11

Welding Equipment

TWECO PRODUCTS CO., Wichita 1, Kans. Catalogue describing Tweco welding electrode-holders, ground clamps, cable connectors, and other equipment for electric welding. Bulletin containing information on causes and cures for hot-running welding cables and connectors...12

Recording Surface Irregularities

PHYSICISTS RESEARCH CO., 321 S. Main St., Ann Arbor, Mich. Bulletin descriptive of the "Proficorder"—a mechanical-electronic instrument that provides a chart record of irregularities on machined or finished surfaces. 13

Pneumatic Riveters

LEMERT ENGINEERING CO., Plymouth, Ind. Bulletin 74, describ-

Welded Design Cuts Costs 20%, Improves Saleability

By Louis E. Kibler, Engr.
A. K. Robins & Co., Inc.
Baltimore, Md.

THE urgent need for hard-to-get parts used in the conventional construction of the "goosenecks" for our food conveyors prompted us to redesign them to an all welded steel construction. The new design has netted us savings of 25% in fabricating time and of 20% in material costs. (Fig. 1.) Furthermore, the appearance of the finished machine has been enhanced considerably and the weight reduced 92 pounds, improving its saleability.

The original design of "gooseneck" involved an assembly of three separate parts bolted together. (Fig. 2.) The parts had to be milled, drilled and then tapped. The assembly also required careful matching and fitting of each side frame unit before bolting the parts together.

Our new welded design eliminates the need for any jigs or fixtures. In place of the former "gooseneck" component parts, the new design specifies 3/16" steel plate sheared from stock to any desired angle and size to comprise the side frame sub-unit. The angle iron tracks and guides are welded to the side frame and then notched. The tracks and guides are bent to the required angle to conform with the shape of the steel plate, clamped into position and welded one piece at a time with a Lincoln "Shield-Arc Jr." D.C. welder and "Fleetweld 37" electrode. (Fig. 4.) In the "gooseneck" assembly alone, the weight has been reduced from 67½ to 44½ pounds.

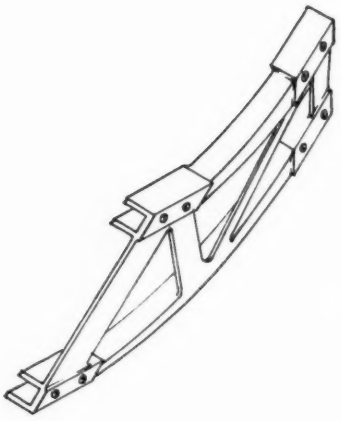

Fig. 2. Original "gooseneck" assembly. Weight 67½ lbs.

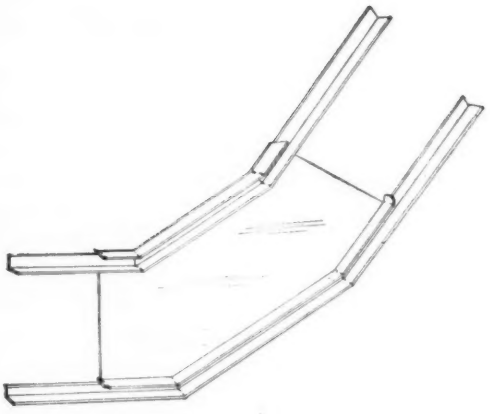

Fig. 3. Redesigned "gooseneck" of arc welded parts. Weight 44½ lbs.

An additional sales advantage of the welded conveyor is the fact that we can now match the customer's needs more readily by supplying any size or angle of "gooseneck." In our previous design little change in detail could be accommodated without involving a prohibitive expense.

To gain the same advantages on other sub-units of our conveyor the tanks, frames, drive pulleys and brackets have also been converted to welded design.

Fig. 1. All welded design food conveyor for the canning industry.

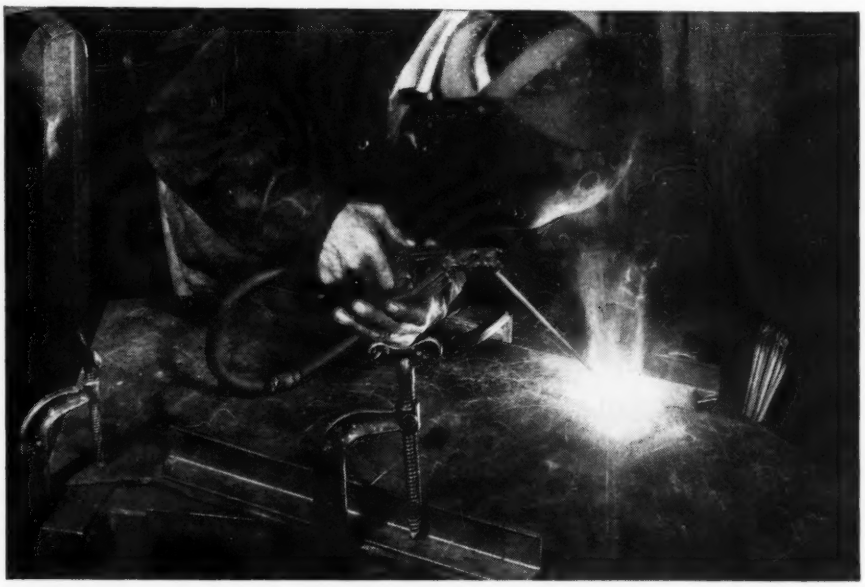

Fig. 4. Arc welding the guides to the side frame plate.

The above is published by LINCOLN ELECTRIC in the interests of progress. Machine Design Studies are available to engineers and designers. Write The Lincoln Electric Company, Dept. 42, Cleveland 1, Ohio.

ing the operation of Airflex "Rotating Impact" riveters, designed to rivet unsupported work and brittle materials, such as glass, plastics, etc. 14

Gears and Gear Reducers

D. O. JAMES GEAR MFG. CO., 1140 W. Monroe St., Chicago 7, Ill. Catalogue 1000, containing 575 pages of engineering and catalogue data on gears and gear reducers of aid in selecting the right type for different classes of work. 15

Device for Simplifying Lay-Outs on Jigs

GRA-ART INDUSTRIES, 3098 Parker Ave., Detroit 14, Mich. Chart illustrating the uses of the "Angle-Later," a device designed to simplify lay-outs and shop measurements on jigs and fixtures. 16

Carbide-Tipped Tools

WHITMAN & BARNES, 2108 W. Fort St., Detroit 16, Mich. Catalogue 101, listing carbide-tipped drills, reamers, and other tools. Information is included on use and care of tools, speeds, feeds, and grinding recommendations. 17

Carbide Tools

CARBOLOY COMPANY, INC., 11147 E. Eight Mile Ave., Detroit 32, Mich. Catalogue GT-200, containing 65 pages of data on carbide tools and other cemented-carbide products, including specifications and prices. 18

Double-Spindle Disk Grinders

HANCHETT MFG. CO., Big Rapids, Mich. Bulletin 647-1, illustrating and describing Hanchett double-spindle disk grinders designed to finish opposite faces of work-pieces flat and parallel simultaneously. 19

Calculator for Adding and Subtracting

ELEMOTO SALES CO., Teaneck, N. J. Pamphlet containing information on the Elemoto calculator, which mechanically adds and subtracts mixed numbers and fractional dimensions. 20

Chart for Selecting Induction Heating Equipment

AJAX ELECTROTHERMIC CORPORATION, Trenton 5, N. J. Chart prepared to aid in the selection of induction heating and melting equipment for various applications. 21

Hydraulic Stock Feed and Straightener

HALLER MACHINE & MFG. CO., INC., 7940 Tireman Ave., Detroit 4, Mich. Bulletin descriptive of the Haller hydraulic stock feed, stock straightener, and scrap cutter for use on punch presses.....22

Recessing Tools

MAXWELL CO., 386 Broadway, Bedford, Ohio. Bulletin R-246, describing the Maxwell line of recessing tools for drill presses, boring mills, turret lathes, automatics, and milling machines.....23

Planer Millers

CINCINNATI PLANER CO., Cincinnati, Ohio. Bulletin 106, containing complete information on Cincinnati "Hypro" planer type milling machines with electronic drive. 24

Welding Electrodes

AMPCO METAL, INC., 1745 S. 38th St., Milwaukee 4, Wis. Bulletin W-17, containing information on the welding of a wide variety of alloys with Ampco bronze arc-welding electrodes...25

Screw Machine Pushers

MODERN COLLET & MACHINE CO., 401 Salliotte St., Ecorse 18, Mich. Circular descriptive of Galco and H & G master pushers with collet type grip for screw machines. 26

Non-Slip Collets

SHELL MACHINE CO., 21306 John R St., Hazel Park, Mich. Circular illustrating and describing a new design of collet with spiral-grip serrations, said to reduce slippage to a minimum.....27

Welding Equipment

DALHART ENGINEERING & MFG. CO., 14827 E. Jefferson Ave., Detroit 15, Mich. Pamphlet describing a new double-acting hydraulic welding gun and booster with high production capacity. 28

Air Cylinders

MILLER MOTOR CO., 4027 N. Kedzie Ave., Chicago 18, Ill. Bul-

To Obtain Copies of New Trade Literature

listed in this section (without charge or obligation), fill in below the publications wanted using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue (February, 1948) to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

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letin A-105, containing complete information on air cylinders with bores ranging from 1 1/2 to 14 inches. 29

Production Control

CHRONOLOG, INC., National Bank Bldg., Detroit 26, Mich. Bulletin describing the new Model X "Chronolog," made by the National Acme Co., for automatically recording production and idle machine time. 30

Hydraulic Grinding Machines

LANDIS TOOL CO., Waynesboro, Pa. Bulletin descriptive of the Landis Type F plain hydraulic heavy-duty grinding machine, made in 14- and 16-inch swings...31

Coloring of Copper and Brass

COPPER & BRASS RESEARCH ASSOCIATION, 420 Lexington Ave., New York 17, N. Y. Pamphlet entitled "Coloring Copper, Brass, and Bronze." 32

Industrial Radiography Materials

EASTMAN KODAK CO., X-RAY DIVISION, Rochester 4, N. Y. Catalogue descriptive of materials and accessories for industrial radiography. 33

Precision Tumbling

NORTON CO., Worcester 6, Mass. Pamphlet containing technical information on precision tumbling with alundum abrasive. 34

Centering Machines

WHITON MACHINE CO., New London, Conn. Folder illustrating and describing the newest designs of Whiton centering machines...35

Alloy-Steel Dowel-Pins

STANDARD PRESSED STEEL CO., Box 22, Jenkintown, Pa. Circular announcing a new line of "Unbrako" alloy-steel dowel-pins.....36

Electric Trucks

CRESCENT TRUCK CO., Lebanon, Pa. Bulletin illustrating and describing the Crescent new model Palletier electric fork truck. 37

Used Machine Tools

J. L. LUCAS & SON, INC., Bridgeport 5, Conn. Circular listing used machine tools of recent types. 38

American Society of Tool Engineers to Discuss Problem of Increasing Production

The technical sessions at the sixteenth annual meeting of the American Society of Tool Engineers, which will be held coincidentally with the Tool Engineers' Show, March 15 to 19 at Cleveland, Ohio, will be devoted to subjects related to the problem of increasing production. These sessions have been limited to three meetings, which will be held at 8 P.M. on Monday, Tuesday, and Wednesday, in the ball room of the Hotel Cleveland.

The subject on Monday night, March 15, will be "Work Handling Simplification." A paper will be delivered by Allan H. Mogensen, industrial consultant and director of the Lake Placid Work Simplification Conference. The chairman of the session will be G. A. Rogers, Rudel Machinery Co., Ltd., Montreal, Canada. This meeting was arranged because increased efficiency in work-handling is considered one of the most urgent needs today in all phases of manufacture.

"Dies—Control of Deep Draws and Irregular Shapes" will be the subject of the technical session on Tuesday, March 16. The principal speaker will be N. E. Rothenthaler, superintendent of production and planning, steel operations, Ford Motor Co., Dearborn, Mich. The chairman of the meeting will be Arthur D. Lewis, president of Art Lewis Production Equipment Co., Glendale, Calif. Recent developments in the field of deep-metal drawing which result in increased production and reduced costs make this session of particular importance.

On Wednesday, March 17, a quiz program will be conducted for tool engineers under the chairmanship of Robert W. Ford of the Ex-Cell-O Corporation. Twenty-five questions submitted by members to the National Program Committee will be answered by a panel of experts. Those contributing the selected questions will be awarded a copy of "The Tool Engineers' Handbook," soon to be published, and a certificate of appreciation.

The panel experts will include N. E. Rothenthaler; Emil Gairing, president of the Gairing Tool Co., Detroit, Mich.; Allan H. Mogensen; E. W. Miller, vice-president and general manager of the Fellows Gear Shaper Co., Springfield, Vt.; A. H. d'Arcambal, vice-president and consulting metallurgist of Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn.; William H. Oldacre, president of the D. A. Stuart Oil Co., Chicago, Ill.; and James K. Fulks, vice-president in charge of manufacturing of the Ex-Cell-O Corporation, Detroit, Mich.

Plant tours have been scheduled to a number of Cleveland industrial plants, including the Warner & Swasey Co.; the Ohio Crankshaft Co.; the White Motor Co.; Fisher Body Division of the General Motors Corporation; the National Acme Co.; the Nela Park plant of the General Electric Co.; the Weatherhead Co.; the Reliance Electric & Engineering Co.; the Republic Steel Corporation; and Jack & Heintz Precision Industries, Inc.

Lincoln Foundation Presents Library to Swedish College

The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, has presented the Lincoln Welding Library, consisting of over 150 volumes, comprising the most important books on welding published, to the Engineering College of Boras, Sweden. The gift was made in honor of Erik Oberg, a former graduate of the college, who recently retired as Editor of MACHINERY after forty years service with this publication. The Lincoln Welding Library is placed as a unit on special shelves in the college library.

* * *

Only 920,000 motor vehicles a year were scrapped from 1942 through 1946, compared with 2,350,000 vehicles scrapped yearly from 1937 through 1941. It appears certain that the automotive industry will be working on a backlog of orders for some time.

By E.S.S.

BETWEEN GRINDS

Calling All Tool Engineers and Production Men

We've hopped right back on the band wagon for another Show—this time the Tool Engineers' Show to be held in Cleveland from March 15 to 19, inclusive. So March MACHINERY will be a feature number, giving our readers both the highlights on the Show and the lowdown on new types of tools, their design, and methods of making them. Problems close to the heart of the tool engineer and production man will be mulled over in a goodly—and good—number of articles. We are really dressing up for this March number, and will be resplendent in a heavy coated paper stock and beautiful duotone ink, reminiscent of the best used in our pre-war issues.

The Forgotten Machinist

We think you'll be interested in this three-way correspondence involving a man, a machine tool company, and a magazine. The Rockford Machine Tool Co. received a letter from one of our readers:

"Gentlemen: I am not in a position to buy or to recommend the purchase of any machine more expensive than a pencil sharpener. I am just a mechanic, one of those fellows that get things done with what we have. I have always worked with worn-out machines and I expect that I will always have to. I dream of what it must be like to set up and operate adequate equipment less than twenty years old. You can understand my interest in your advertisement in MACHINERY. I would appreciate very much receiving your new 32-page catalogue describing your modern machine tools. Enclosed find 50 cents to help defray handling and mailing charges."

Mr. A. M. Sanner, the advertising manager of Rockford, passed the letter on to us with the comment that it expressed a specific condition in an unusual way. He added, "We are sure the gentleman who wrote the note is not seeking any publicity. He is probably well satisfied with his catalogue of Rockford machine tools, which he received gratis."

The Editor replied to Mr. Sanner: "We have seen quite a few shops which, unfortunately, try to get along with such equipment as your correspondent describes. His letter constitutes additional evidence of the necessity for machine tool manufacturers and technical magazines to pound away at the high cost of using obsolete machinery."

Box Office Appeal

Our subscription department took on the aspect of a box office as a result of a letter from a Rotterdam - Luid correspondent who was having difficulty with our complex language. He wrote: "One of these days the book MACHINERY came under my eyes. And now I request you politely for information whether the periodical is gratis or there must be paid season ticket with paying difficulties, etc." The letter was addressed to "Sir Harold L. Gray, Secretarie and Publisching Manager." "Sir Harold," needless to say, was royally alarmed by that one word internationally understood, *gratis*.

Mind Repeating it, Old Man?

Recently we supplied some information to one of our subscribers, Mr. Jagdishchandra Agarwal of the importing firm of Fateh Chand Ram Richhpal, whose address is Chandni Chowk, Katra Asharfi, Delhi, India. Steady there, printer—we would not like to see a misspelled word on this page.

Scan Our Span

How long do you keep your copies of MACHINERY? From our own advertising of technical books in MACHINERY we know that you were still clipping book order coupons from the May, 1945, number eleven months later and you were still using the June, 1945, issue in February, 1946. Returns from our regular book advertising in twenty-four issues showed that the average life of an issue is seven and one-half months. Of course, we know of readers who have kept complete files of MACHINERY for years back. It would be interesting to hear from others who have maintained such files.

This Pun is on the House

Notice reached the Editor's desk that the first Industrial Conference on Alcoholism will be held in March with its purpose "to bring to the attention of industry leaders facts pertaining to the problem of alcoholic employes and to discuss ways and means of overcoming the problem." Co-chairman is James H. Oughton, Jr. We think his topic will be "You Oughton to Have Done It."

New Gage Uses X-Rays to Measure Material Thickness

X-rays are used as a measuring medium in a new thickness gage developed by the Westinghouse Electric Corporation's X-Ray Division at Baltimore, Md. This gage is designed to measure and control the thickness of cold-rolled steel and copper sheets, aluminum, glass, plastics, paper, and other materials made by a continuous process. Besides giving an indication of the thickness of sheet or strip passing above it, the gage can be connected to basic production equipment through a servomechanism in order to control the quality of the final product. In one copper mill, for example, it is used to maintain automatic control of the roll screw-downs; on classifier and shear lines, it can be arranged to separate prime sheets from off-gage sheets.

Two X-ray sources and one photo-tube pick-up device are the essential parts of the gage. One of the X-ray sources directs radiation up through the sheet being measured so that the transmitted rays will strike the pick-up. The other source directs rays horizontally through a standard sample of the same material, having the desired thickness, so that these also strike the pick-up. Both sources operate alternately—180 degrees out of voltage phase—and the pick-up device compares the intensity of the two X-ray beams. Any difference is registered on an indicating instrument.

The sensitivity of the gage is such that it will indicate a deviation of 0.00001 inch in a sheet 0.010 inch thick. Since it compares a standard sample with mill production sixty times a second, it is capable of making a spot check about every 1 2/3 foot on sheet delivered from a rolling mill at the rate of 6000 feet per minute.

Its basic advantages are said to be that it does not make contact with the material being gaged, and thus does not mar the sheet and is not affected by surface coatings; it responds to changes in thickness instantaneously; and it can be used to check areas previously inaccessible. Also, it is normally mounted on a slide, so that it can be easily removed from the production line. It can also be arranged to "rove" across the sheet.

Silicone Rubber Developed for Gaskets and Oil Seal of High-Temperature Engines

Silicone rubber—a new synthetic material—may provide the solution to many high-temperature sealing problems in gas turbines and reciprocating engines, as well as in a wide variety of industrial equipment, according to a paper presented before a meeting of the American Society of Mechanical Engineers. Potential industrial uses include its application as a coating for wire; and, combined with glass cloth, as wrapping tape for electrical coils.

The material is produced by compounding a silicone gum with suitable fillers and vulcanizing the compounded rubber stock. It retains its flexibility, resiliency, and surface hardness from temperatures of minus 70 degrees F. to plus 500 degrees F., and is unaffected by long periods of heat aging.

Since the properties of silicone rubber do not match those of natural or synthetic rubber at room temperature, it was pointed out that misconception of the application of the material will arise if it is merely substituted for conventional rubber in existing designs. However, design problems are simplified by the use of silicone rubber because fabrication of finished parts can be accomplished in many ways; techniques of molding, extrusion, wire coating, laminating, cloth coating, and bonding have been worked out successfully.

* * *

Tableware, jewelry, and other products made of zirconium and titanium are envisioned by Dr. John W. Marden, Westinghouse metallurgist. Strong yet light, both rare metals take a high polish and will not tarnish. Their high price could be cut by large-scale production.

Unique Electrical System for Welding

To ease the demand of resistance welding equipment on plant power systems, the Progressive Welder Co., Detroit, Mich., has perfected a relatively simple device that supplies the heavy peak currents required. The device, consisting of an electric motor, a low-voltage generator, and an extremely heavy flywheel, takes a small amount of power from an ordinary electric supply line to run the three-phase motor and store this energy up in the rapidly spinning flywheel. When the heavy load is applied, the generator, instead of stalling its driving motor under the overload, is kept turning by the energy of the flywheel, re-converting the mechanical energy in the flywheel back into electrical current of the high intensity required. While this occurs, the flywheel slows down slightly. As soon as the load is cut off again, the motor speeds up the flywheel, restoring the energy consumed.

One unit, which was driven by a 15-H.P. motor and connected to a flash-welder on which two pieces of 1 3/4-inch diameter steel were welded together, was in operation at the National Metals Exposition in Chicago; the slowing down of the flywheel was actually imperceptible to the ear, indicating the large amounts of power that can be stored in this manner for use as needed.

* * *

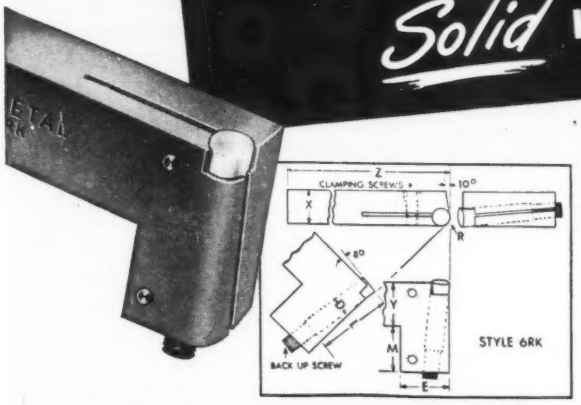
Armour Precision Gage Laboratory

The Armour Research Foundation of the Illinois Institute of Technology, Chicago 16, Ill.—an organization founded to render research and experimental engineering service to industry, Government, and the public—announces that the precision gage laboratory operated before the war by the Foundation and maintained during the war years by the U. S. Ordnance Department, is being operated again as one of the special service laboratories of the Foundation. The facilities of this laboratory are now available to industry for the calibration of precision measuring standards, instruments, and manufactured components.

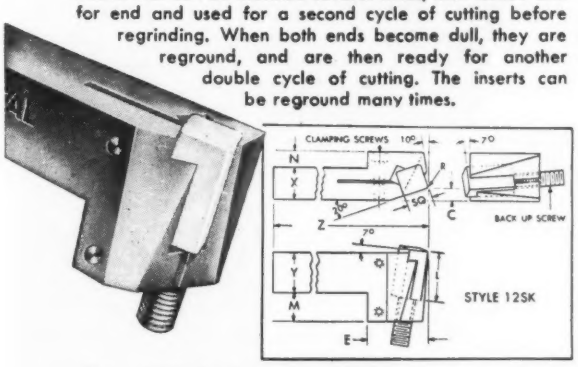
Another KENNAMETAL Development

KENNAMATIC Tools

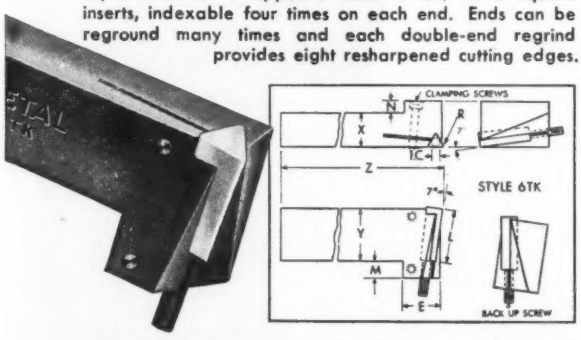
having CLAMPED-IN, INDEXABLE Solid KENNAMETAL Inserts



Style 6RK (and opposite hand 3RK) have cylindrical inserts that can be indexed several times, then turned end for end and used for a second cycle of cutting before regrinding. When both ends become dull, they are reground, and are then ready for another double cycle of cutting. The inserts can be reground many times.



Style 12SK (and opposite hand 11SK) have square inserts, indexable four times on each end. Ends can be reground many times and each double-end regrind provides eight resharpened cutting edges.



Style 6TK (and opposite hand 3TK) have triangular inserts, indexable three times on each end. Ends can be reground many times—and each double-end regrind provides six resharpened cutting edges.

Solid, Mechanically-Held Kennametal Inserts

Inserts are mechanically-held, *vertically*—best use is made of high compressive strength of Kennametal (up to 800,000 PSI); brazing strains are eliminated.

Indexable Cutting Edges

Can be indexed 6 to 12 times before regrinding. Indexing is a simple operation, and does not require changing tool holder.

Replaceable Inserts

Few standard sizes can be used in a variety of tools and jobs—simplifies tool control; reduces toolroom stocks.

Simplified Regrinding

Resharpening merely requires squaring off both ends of insert, and grinding chip breaker if required—reduces load and confusion in grinding room.

Permanent Setting

Insert can be indexed or changed without changing tool holder setting—less set-up and machine down time.

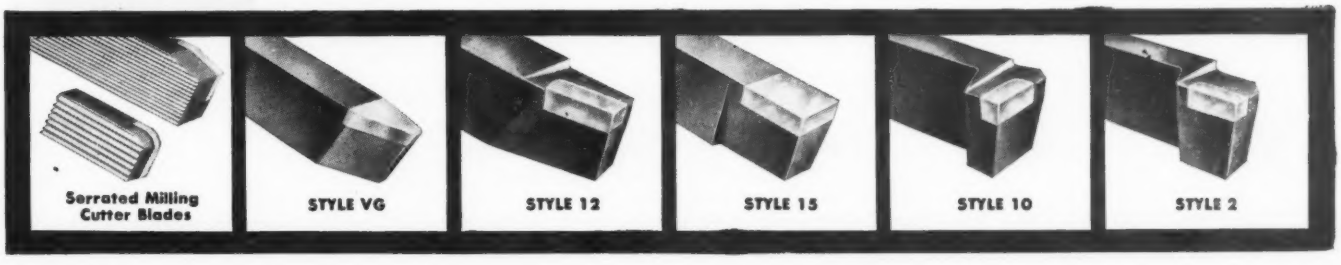
The overall result of Kennamatic tooling is that higher production rates can be reached, and maintained, at much less cost. Let our engineers suggest suitable applications.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL *Inc.*, LATROBE, PA.



News of the Industry

California

AIR REDUCTION CO., 60 E. 42nd St., New York 17, N. Y., announces that it has formed a new wholly owned subsidiary to be known as the AIR REDUCTION PACIFIC CO., which will carry on all the business formerly conducted by the Air Reduction Sales Co. in the West, including the San Francisco, Los Angeles, Portland, and Seattle sales districts. H. P. ETTER, formerly sales manager of the Pacific Coast Division, will be president and director of the new subsidiary. His headquarters will be at Room 1813, Mills Tower, 220 Bush St., San Francisco 4, Calif.

STERLING ELECTRIC MOTORS, INC., Los Angeles, Calif., recently held its first post-war annual international sales conference at which the complete line of Sterling improved models of electric power drives were introduced to the sales and manufacturing executives of the domestic and foreign offices and plants of the company. It was announced at the conference that eighteen additional district sales offices have been opened and many new distributors appointed.

Illinois and Indiana

OHIO CRANKSHAFT CO., TOCCO DIVISION, Cleveland, Ohio, manufacturer of induction heating equipment, announces the addition of an engineering department to its Chicago office. The new department will enable the company to offer improved service in the Middle West on all phases of induction heating applications. L. C. SCHWEITZER remains Chicago district manager, and A. O. WOOD, who has been closely associated with the Tocco process since its original development, has been appointed district engineer.

DR. W. E. WILSON has been appointed director of research of the Hydraulic Division of the Sundstrand Machine Tool Co., Rockford, Ill. During the war, Dr. Wilson was chairman of the department of fluid mechanics at the Armour Research Foundation. Before joining the Sundstrand staff, he was engaged in consulting engineering.

ALFRED J. OLSON has been appointed assistant sales manager of the Chicago plant of Joseph T. Ryerson & Son, Inc., Chicago 80, Ill., succeeding RAY C. PAGE, who was recently named sales manager of the company's new steel service plant now under construction in the San Francisco area.

NON-FERROUS INGOT METAL INSTITUTE, 308 W. Washington St., Chicago, Ill., announces that the name of the organization has been changed to BRASS AND BRONZE INGOT INSTITUTE, a name which is believed to more clearly define the activities of the organization.

J. G. GREEN has been appointed mid-western representative for the Reading Chain & Block Corporation, Reading, Pa., manufacturer of chain hoists, electric hoists, and traveling cranes. Mr. Green's headquarters will be at 407 S. Dearborn St., Chicago, Ill.

ARMSTRONG BROS. TOOL CO. has recently moved its general offices and works into a new plant at 5200-5300 W. Armstrong Ave., Chicago 13, Ill., which affords over 170,000 square feet of manufacturing space. The building is of modern monitor type, one-story construction.

CAMCAR PRODUCTS CO., 600 18th Ave., Rockford, Ill., has recently completed a new one-story plant for the manufacture of special and standard screw products, which is now in full production.

SNOW MFG. CO., manufacturer of air tapping and drilling equipment, announces a change in the address of the company from 615 S. California Ave., Chicago 12, Ill., to 435 Eastern Ave., Bellwood, Ill.

HARRY K. MILLER, Chicago representative for the Hobart Brothers Co., Troy, Ohio, manufacturer of arc-welding equipment, has moved from 542 W. Washington Blvd., Chicago, Ill. to 7426 S. Halsted St.

WILLIAM C. MADSEN has been appointed branch manager of the Gary, Ind., office of the Reliance Electric & Engineering Co., Cleveland, Ohio, succeeding H. J. THOMPSON, who has become district sales representative in Gary for the Electrical Manufacturing Division of the National Acme Co., of Cleveland.

GEORGE KEAGY has resigned as plant manager of the Perfect Circle Corporation, Hagerstown, Ind., and has been succeeded by his assistant, GEORGE MYERS. Mr. Keagy will continue to serve as a member of the board of directors.

Michigan

STANLEY L. WILLIS has been appointed president and general manager of the Standard Tube Co., 24400 Plymouth Road, Detroit, Mich., succeeding T. F. THORNTON, who has retired. Mr. Willis was formerly vice-president and general manager of the company, and has been connected with the organization since 1943.

ALVIN HASS has joined the Hanchett Mfg. Co., Big Rapids, Mich., manufacturer of grinding machines, magnetic chucks, and saw and knife fitting tools, in the capacity of vice-president and general manager. He was for seventeen years president and general manager of Yates-American, Beloit, Wis.

ROBERT F. GLADFELTER has been appointed general sales manager of the Detroit Power Screwdriver Co., Detroit, Mich., manufacturer of magazine-feed power screwdrivers and master hopper units. Mr. Gladfelter succeeds to the position held for many years by his father, R. H. Gladfelter, who died last July. The new sales manager has been connected with the company since 1940. Starting at the bottom, he has familiarized himself with every department of the business, and during the war was in charge of final assembly, inspection, and testing of machines. For the last two years, he has been assistant sales manager of the company.

© Monett Studios

Robert F. Gladfelter, New General Sales Manager of Detroit Power Screwdriver Co.

New Ozalid Streamliners Now Available For Immediate Delivery

Now, you can order—and promptly receive—a new, moderately priced print-making unit that gives you these 5 new advantages at no extra cost:

1. **SPEED.** In 25 seconds an Ozalid Streamliner reproduces your engineering drawings . . . or anything typed, drawn, printed or photographed on *translucent* paper.

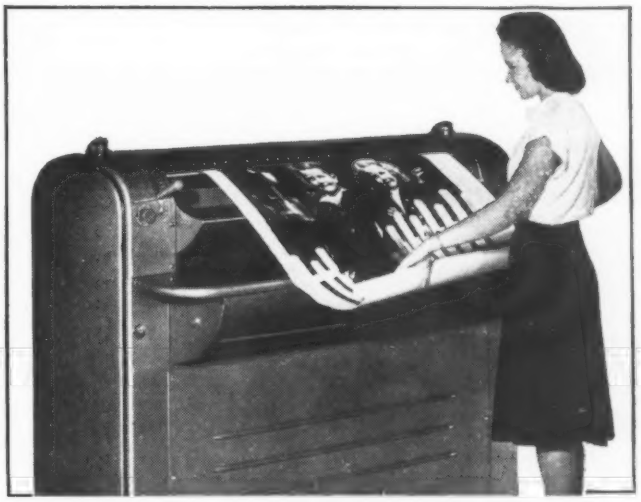
2. **EFFICIENCY.** You always get an exact-size positive (not negative) copy direct from your original . . . produced in 2 quick steps—Exposure and Dry Development.

3. **ECONOMY.** An 8½" x 11" print costs you less than one and a half cents per copy.

4. **VERSATILITY.** The lines and images on your original can be reproduced in black, blue, red, sepia, yellow . . . on paper, cloth, foil, film, or plastic.

5. **SIMPLICITY.** Anyone can be the operator. Place your original on Ozalid paper and feed into the Streamliner; that's 95% of the job.

Now an easy desk job. You remain seated, relaxed. All controls within easy reach. Prints are delivered on top, completely dry. Another advantage: You can install your Streamliner in any drafting room or office. Only 6 square feet of floor space is required.



A minute ago—engineering drawings. Now she's producing beautiful Ozalid Dryphotos in seconds, in exactly the same manner. Note the size: Ozalid prints can be up to 42" wide, any length. You can reproduce advertising posters, accounting reports—the work of all departments.

Expanded Production Facilities Now Permit Immediate Delivery

Thousands of Streamliners already installed. The following list is a typical cross-section of users:

Armstrong Cork Company
Bethlehem Steel Corp.
Bloomingdale Brothers
Bulova Watch Company
Chris Craft Corporation
Chrysler Corp.
Columbia Broadcasting System
Dun & Bradstreet
E. I. DuPont
General Electric Co.
General Motors Corp.
International Harvester Co.
Lever Brothers
Montgomery Ward Co.
New York Central Railroad
Northern Pacific Railway Co.
Pan American Airways, Inc.
Paramount Pictures, Inc.
Parke, Davis & Co.
Pittsburgh Plate Glass Co.
Remington Rand
Scovill Manufacturing Co.
E. R. Squibb & Son
Standard Oil Co.
Swift & Co.
Westinghouse Electric Co.

MAIL COUPON TODAY FOR FREE BOOKLET

Dept. No. 22

OZALID Division of General Aniline & Film Corporation, Johnson City, New York

Gentlemen: Please send free, 24-page, illustrated booklet . . . showing all of Streamliner's uses and 10 types of Ozalid prints.

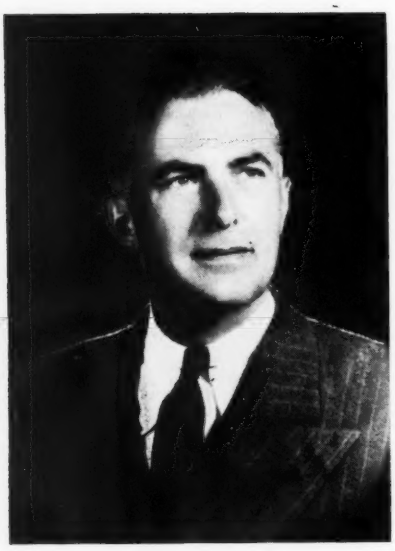
Name_____

Position_____

Company_____

Address_____

Ozalid in Canada—Hughes Owens Co., Ltd., Montreal



K. R. Beardslee, Recently Appointed Marketing Manager of Carboloy Company

CARBOLOY COMPANY, INC., Detroit 32, Mich., has established a new marketing organization designed to provide increased and more effective service to carbide users all over the United States. Heading the new organization is K. R. BEARDSLEE, formerly vice-president in charge of sales, who now becomes vice-president and marketing manager. Under the new set-up, all sales will be directed by J. E. WELDY, who has been named sales manager, and all merchandising activities by E. C. HOWELL, merchandising manager.

PAUL S. STRECKER has been named assistant to the president of the E. W. Bliss Co., 450 Amsterdam Ave., Detroit, Mich., manufacturer of presses, rolling mills, and can machinery. He will also continue to serve as personnel director of the company. J. J. RADIGAN, personnel manager of the Bliss Brooklyn plant, has been promoted to the post of assistant director of personnel.

HANCHETT MFG. CO., Big Rapids, Mich., and GALLMEYER & LIVINGSTON CO., Grand Rapids, Mich., recently had a banquet in Grand Rapids at which Latin American machinery dealers met with representatives of the two companies to discuss mutual problems arising in the machine tool export field.

PETER F. HURST has been elected president of the Aeroquip Corporation, Jackson, Mich., manufacturer of flexible hose lines, fittings, and hydraulic accessories. He was previously executive vice-president and general manager.

W. F. NEWBERY, formerly industrial sales manager of the Detrex Corporation, Detroit 32, Mich., manufacturer of metal-cleaning equipment and chemicals, has been appointed assistant director of sales.

NATIONAL ACME CO., Cleveland 8, Ohio, has appointed CHRONOLOG, INC., National Bank Bldg., Detroit 26, Mich., agent to market the "Chronolog," an instrument recently developed by National Acme for recording productive and idle machine time.

JULES MULLER has been appointed director of engineering of the E. W. Bliss Co., Detroit, Mich., manufacturer of presses, rolling mills, and can machinery. He will be responsible for the coordination of engineering between the various products divisions. Prior to his present appointment Mr. Muller supervised welding design and manufacture for Bliss machinery.

© John Henderson Studios

Paul S. Strecker, Newly Appointed Assistant to the President, E. W. Bliss Co.

© John Henderson Studios

Jules Muller, Newly Appointed Director of Engineering for the E. W. Bliss Co.

New England

NELCO TOOL CO., INC., manufacturer of carbide-tipped cutting tools, announces the removal of the company from Brooklyn, N. Y., to a new plant recently purchased at 266 Center St., Manchester, Conn., having increased manufacturing facilities.

ALBERT R. HUTCHINGS has been appointed executive engineer in charge of engineering and manufacturing

Albert R. Hutchings, Executive Engineer in Charge of Engineering and Manufacturing for the Carlyle Johnson Machine Co.

for the Carlyle Johnson Machine Co., Manchester, Conn., manufacturers of industrial clutches. Mr. Hutchings succeeds A. R. COE, vice-president, who recently retired.

THOMAS C. BRADFORD, Worcester, Mass., has been appointed field technical engineer for the Anderson Oil Co., Portland, Conn., maker of coolants and "Rustavoid" preservatives.

New York and New Jersey

EASTERN CARBIDE CORPORATION has been organized at 909 Main St., New Rochelle, N. Y., to enable manufacturers to obtain all their carbide needs from one source. The firm will carry a complete line of carbide products, including not only the base metal, but also finished tools and dies, and is prepared to furnish complete carbide tooling for the plastics industry. ANTHONY J. ALLEN is president, and WALTER A. RUPPEL, secretary-treasurer. The new corporation is the eastern distributor for the WENDT-SONIS CO. of Hannibal, Mo., manufacturer of cutting tools.

Why "M-11" produces

MORE TAPPED HOLES PER TAP

M-11 is a chrome-cobalt high speed steel used exclusively by Detroit Tap and Tool Company for taps, thread gages and thread milling cutters. Some of the reasons for its use are:

COBALT . . . **Takes the human element out of hardening. THIS MEANS THAT UNIFORM HEAT-TREAT CAN BE OBTAINED AUTOMATICALLY!**

Increases the red hardness over ordinary HSS. THIS MEANS M-11 TAPS ARE HARDER, TOUGHER AT OPERATING TEMPERATURES.

CHROMIUM . **Increases toughness and strength of steel after heat treatment. THIS MEANS LESS BREAKAGE.**

Causes hardness to penetrate deeper and more uniformly. THIS MEANS SAME QUALITY AFTER AS BEFORE SHARPENING.

Resists corrosion. PROTECTS TOOLS IN TOOL ROOM. ALLOWS GREATER LATITUDE IN COOLANTS.

Permits slower cooling after heat-treat. ELIMINATES NEED FOR QUENCHING WITH ITS CHANCE OF PRODUCING MINUTE HEAT CRACKS AND WARPAGE.

Provides greater resistance to abrasion. THIS MEANS MORE PIECES PER SHARPENING, MORE THREADS PER TAP.

This combination of chromium and cobalt in Detroit Tap's M-11 high-speed steel is available to you at no increase in cost over quality taps made of ordinary high-speed steels. And back of every M-11 tap, thread gage and thread milling cutter is Detroit's SERVICE — a service which can make the proud claim:

WE'VE NEVER "SHUT DOWN" A LINE YET!!

The Home of
"M-11"
CHROME-COBALT HSS TAPS, THREAD MILLING CUTTERS & THREAD GAGES

DETROIT
TAP & TOOL CO.
8432 BUTLER STREET • DETROIT 11, U. S. A.

KENNAMETAL, INC., Latrobe, Pa., announces the opening of an eastern district office at 6 W. Broadway, New York City, for the distribution and servicing of Kennametal cutting tools and wear-resistant parts in eastern New York and northern New Jersey. L. D. MORTON, as eastern district manager; will have charge of the new office, and J. G. BRADY will serve as representative. Mr. Morton was formerly representative in Cleveland, and Mr. Brady in Pittsburgh.

LESTER B. KNIGHT & ASSOCIATES, Chicago, Ill., consulting engineers, have opened an office at 30 Church St., New York City. F. E. BRADWAY will be in charge of the New York office and will act as manager of the Industrial Engineering Division. J. M. PLANTEN will have charge of plant engineering, and R. L. OGDEN will be manager of plant surveys and operation.

THOMAS B. HASLER, for twenty-nine years president of the Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York 17, N. Y., a subsidiary of the Air Reduction Co., Inc., has been elected chairman of the board of directors, succeeding C. E. ADAMS, who has resigned. F. B. ADAMS, JR. has been elected president and a director.

CHARLES B. PROUDFOOT, formerly assistant director of the Engineering and Physics Division of Fredric Flader, Inc., North Tonawanda, N. Y., has joined the research and development laboratory of the Carborundum Co., Niagara Falls, N. Y., in the capacity of senior research engineer in physics.

E. GRAY MERRILL has been appointed to the newly created position of vice-president in charge of manufacturing with the De Laval Separator Co., Poughkeepsie, N. Y. He retains his position as works manager.

HARRY H. ROSE has been named general sales manager of the Simmons Fastener Corporation, Albany, N. Y. He has been a sales engineer for the company during the last three years.

WALTER C. KERRIGAN, JAMES F. MCNAMARA, and T. H. WICKENDEN have been elected vice-presidents of the International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

MARVIN C. BARNUM has been appointed New York representative for the Dayton Rogers Mfg. Co., 2824 Thirteenth Ave., S., Minneapolis 7, Minn.

JOHN A. FELLOWS has been made assistant chief metallurgist for the American Brake Shoe Co.'s Research Center at Mahwah, N. J.

North Carolina

FRANK J. GRUMBACH has been appointed district representative in Charlotte, N. C., for the Berger Manufacturing Division of the Republic Steel Corporation, manufacturer of steel lockers, shelving, shop equipment, filing cabinets, etc.

Ohio

AMERICAN STEEL FOUNDRIES announces the acquisition of the machine tool business of the KING MACHINE TOOL CO., Cincinnati, Ohio, manufacturer of King vertical boring mills and Sebastian lathes. The business will be operated as the King Machine Tool Division of American Steel Foundries. It will be managed by R. D. BRIZZOLARA and C. F. ELMES, vice-presidents. CHARLES F. MULLER, formerly president of the King Machine Tool Co., will be a member of the new staff.

E. W. BLISS CO., Detroit, Mich., manufacturer of metal stamping presses, has transferred its Cleveland, Ohio, sales offices from the N B.C. Bldg. to the Bliss manufacturing plant on E. 222nd St., Euclid, Cleveland. This move was made possible by the addition of a new building, which will enable the company to double its output at the Cleveland plant.

D. E. VAN DEUSEN, president and general manager of the Kelly Reamer Co., Cleveland, Ohio, was elected president of the Cutting Tool Manufacturers' Association at the recent annual meeting in Detroit. He succeeds E. A. GODDARD, president of Goddard & Goddard Co., of Detroit.

D. E. Van Deusen, Recently Elected President of the Cutting Tool Manufacturers' Association

EMIL GAIRING, president of the Gairing Tool Co., was elected vice-president of the Association.

JOHN S. BARNES CORPORATION, Rockford, Ill., manufacturer of hydraulic structures, controls, and fluid power units, has announced the appointment of the B. W. ROGERS Co., 850 S. High St., Akron, Ohio, as its sales representative. The Rogers organization operates principally in the Cleveland, Youngstown, Akron, and Toledo areas.

GEOMETRIC TOOL CO., New Haven, Conn., announces the appointment of additional distributors in the state of Ohio as follows: SCALLAN SUPPLY Co., 2337-2339 Gilbert Ave., Cincinnati 6; and ROSS-WILLOUGHBY CO., 269 W. Spring St., Columbus 15, and P. O. Box 899, 1310 W. Main St., Springfield 99.

CLIFFORD C. TIPPIT, formerly a methods supervisor with the Reliance Electric & Engineering Co., Cleveland, Ohio, has been made manager of a newly created order and planning department.

THOMAS V. KOYKKA has been appointed a member of the board of directors of the Lincoln Electric Co., Cleveland, Ohio, to fill the unexpired term of the late W. B. Stewart.

G. E. TENNEY has been appointed service manager of the Lincoln Electric Co., Cleveland, Ohio.

Pennsylvania

GEORGE R. VASSILY has been appointed representative in charge of sales of the E. W. Bliss Co. mechanical and hydraulic presses and can machinery in the Pittsburgh area, with headquarters at 436 Fourth Ave., Pittsburgh. Prior to this appointment, Mr. Vassily was a sales engineer connected with the Bliss Brooklyn office.

NORMAN C. EINWECHTER, assistant to the vice-president of the Carpenter Steel Co., Reading, Pa., has been placed in charge of the Philadelphia-Reading sales territory, with headquarters in Philadelphia. He has been associated with the company since 1929.

R. B. GERHARDT, chief engineer of construction for the Bethlehem Steel Co., Bethlehem, Pa., retired on January 1 and has been succeeded by his assistant L. J. GOULD. A. J. FISHER will take Mr. Gould's place as assistant chief engineer of construction.

C. PAUL DENCKLA has been made general sales manager for the Philadelphia office of the Dayton Rogers Mfg. Co., Minneapolis, Minn., succeeding the late E. Graepp.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FEBRUARY 1948—FIFTY-FOURTH YEAR

MACHINERY

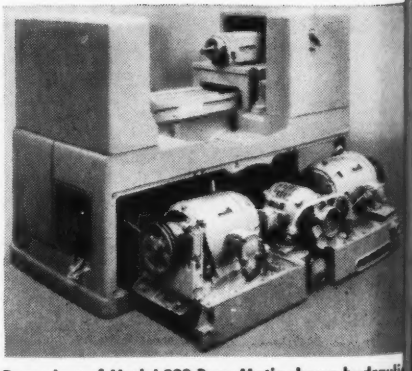
Another *COMPLETELY NEW* Heald Bore-Matic with Double-End Capacity!

● **Faster cycles. Constant speeds. Simplified operation.** These and many more exclusive features make the Heald Model 322 a *completely new* Double-End Bore-Matic—compact in size, but big in capacity.

Borize your medium-size parts on it. It does more in a minute than you ever imagined. Arrange it with multiple spindles at either end for large, awkward work. It bores, turns, faces, chamfers, grooves, fly cuts—with greater power in the cutting and a higher precision in the finish.

The Model 322 is only one of an entirely new line of Heald precision finishing machines—Bore-Matics, Internal Grinders, Surface Grinders—eighteen in all, and each one completely new. There are years of engineering experience behind them—years of uninterrupted, cost-cutting production ahead. The Heald branch office in your part of the country will be glad to give you complete details.

SEND FOR BULLETIN on this Heald Model 322 Bore-Matic and on its smaller double-end partner, the Heald Model 222.



Rear view of Model 322 Bore-Matic shows hydraulic power unit rolled out for easier maintenance, large built-in pan for chips and cutting fluid, electrical control box top right.

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

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